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Shomura

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(54) **OVERLOCK SEWING MACHINE**

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(51) **Int. Cl.**

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D05B 63/00	(2006.01)
B65H 57/12	(2006.01)
D05B 87/00	(2006.01)
D05B 57/34	(2006.01)

(52) **U.S. Cl.**

CPC ***D05B 87/00*** (2013.01); ***B65H 57/12*** (2013.01); ***D05B 57/34*** (2013.01); ***D05B 63/00*** (2013.01); ***D05B 87/02*** (2013.01); *D05D 2207/04* (2013.01)

(58) **Field of Classification Search**

CPC D05B 87/00; D05B 87/02; D05B 63/00; D05B 57/00; D05B 57/02; D05B 57/30; D05B 57/34; D05B 1/12; D05B 1/20; B65H 57/12

See application file for complete search history.

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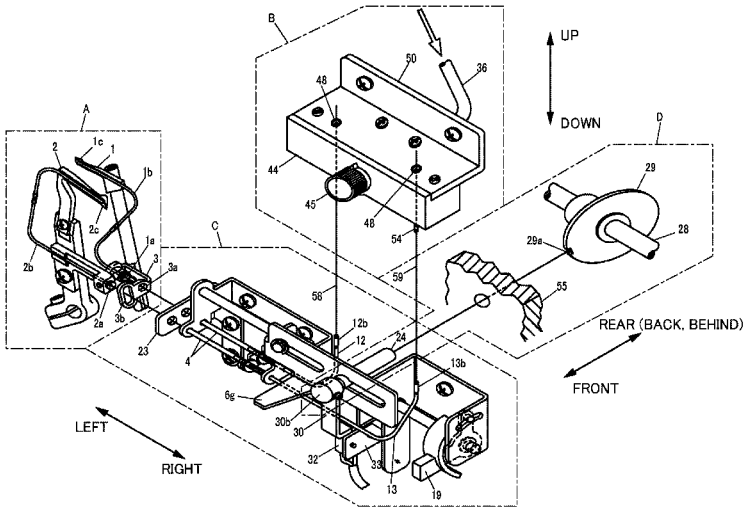
(57) **ABSTRACT**

An overlock sewing machine includes a main shaft fixing operating arm provided with a shaft pin engaging portion that engages with a fixing inner shaft pin and an arm provided to be operable by a user which are integrally rockable within a specified range, and further includes a main shaft fixing operating spring which urging direction is switched in both directions of an rocking direction by exceeding a neutral point by the rocking movements of the main shaft operating arm and the arm.

3 Claims, 27 Drawing Sheets



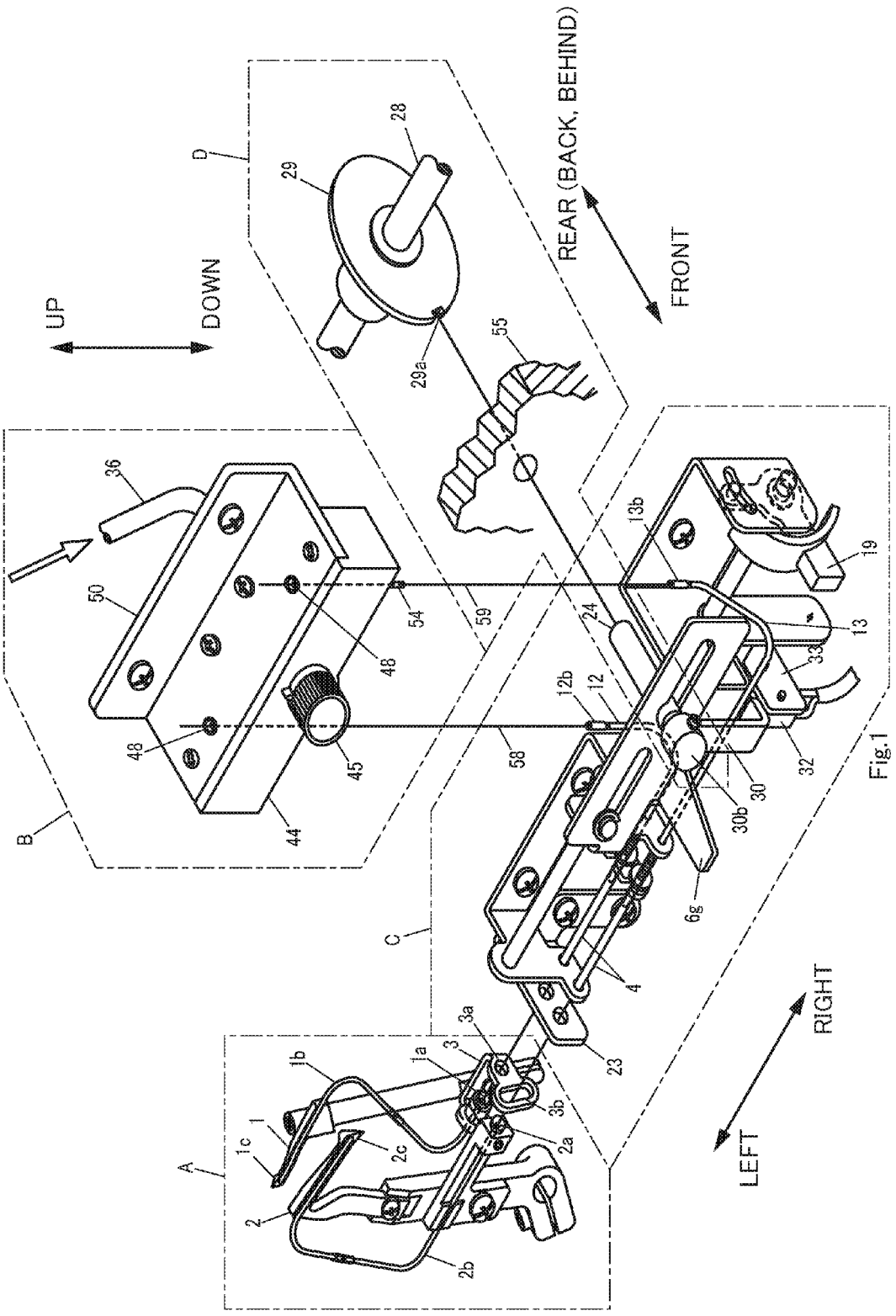

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Fig.1

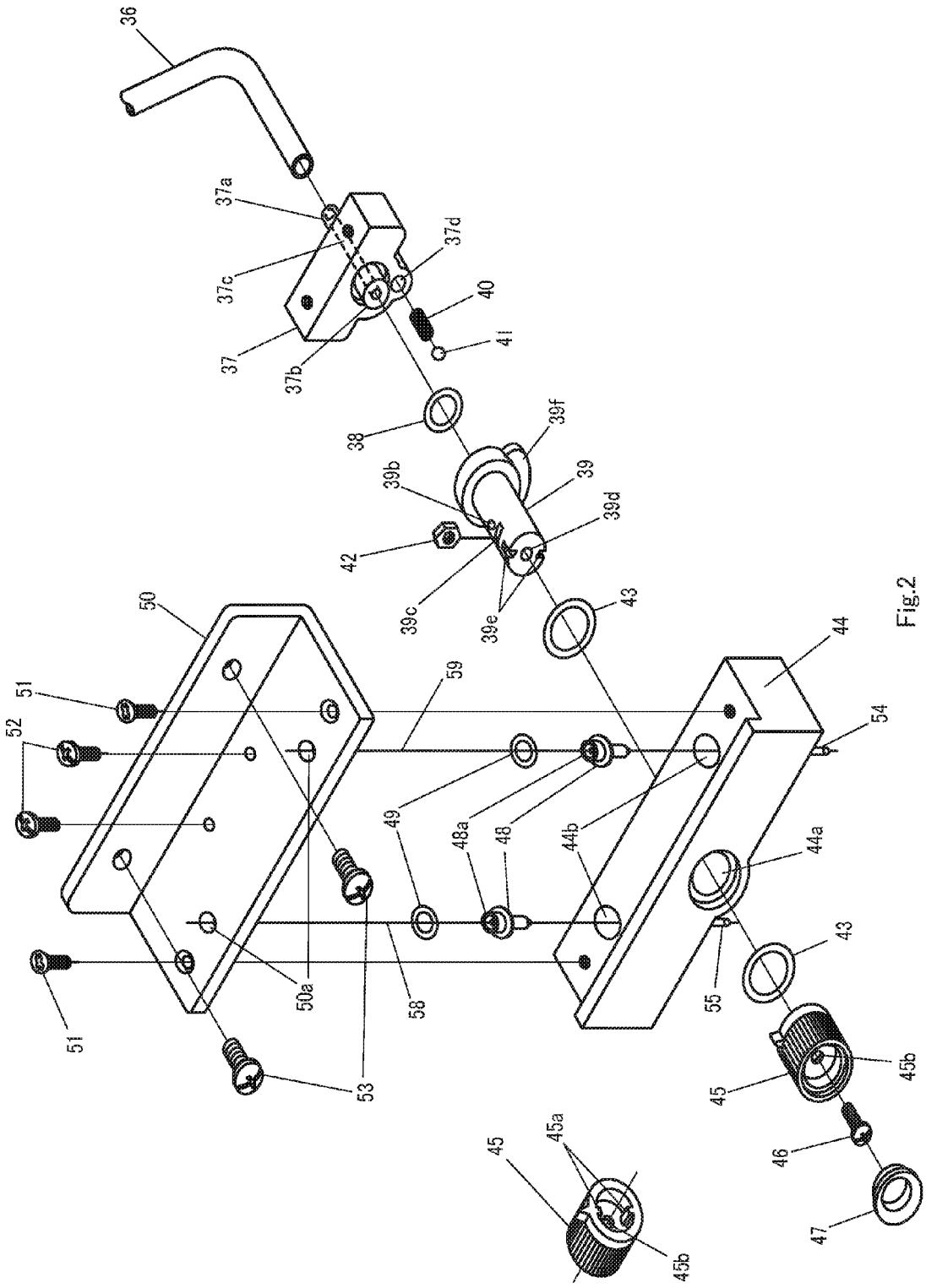
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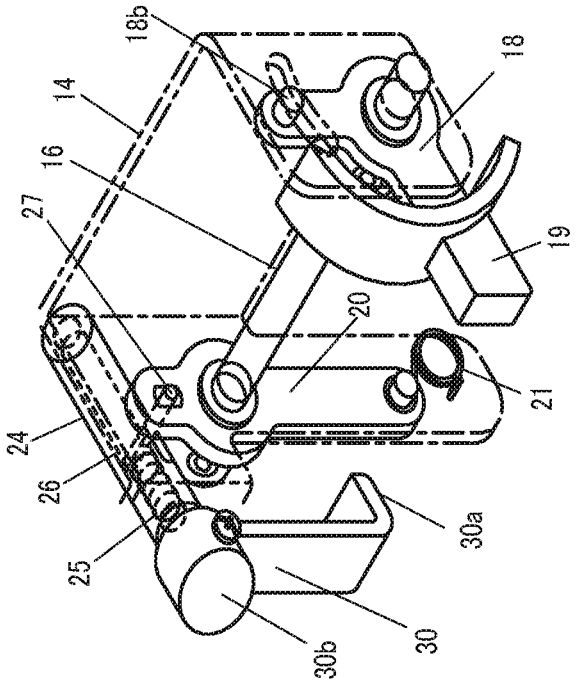
Fig.2



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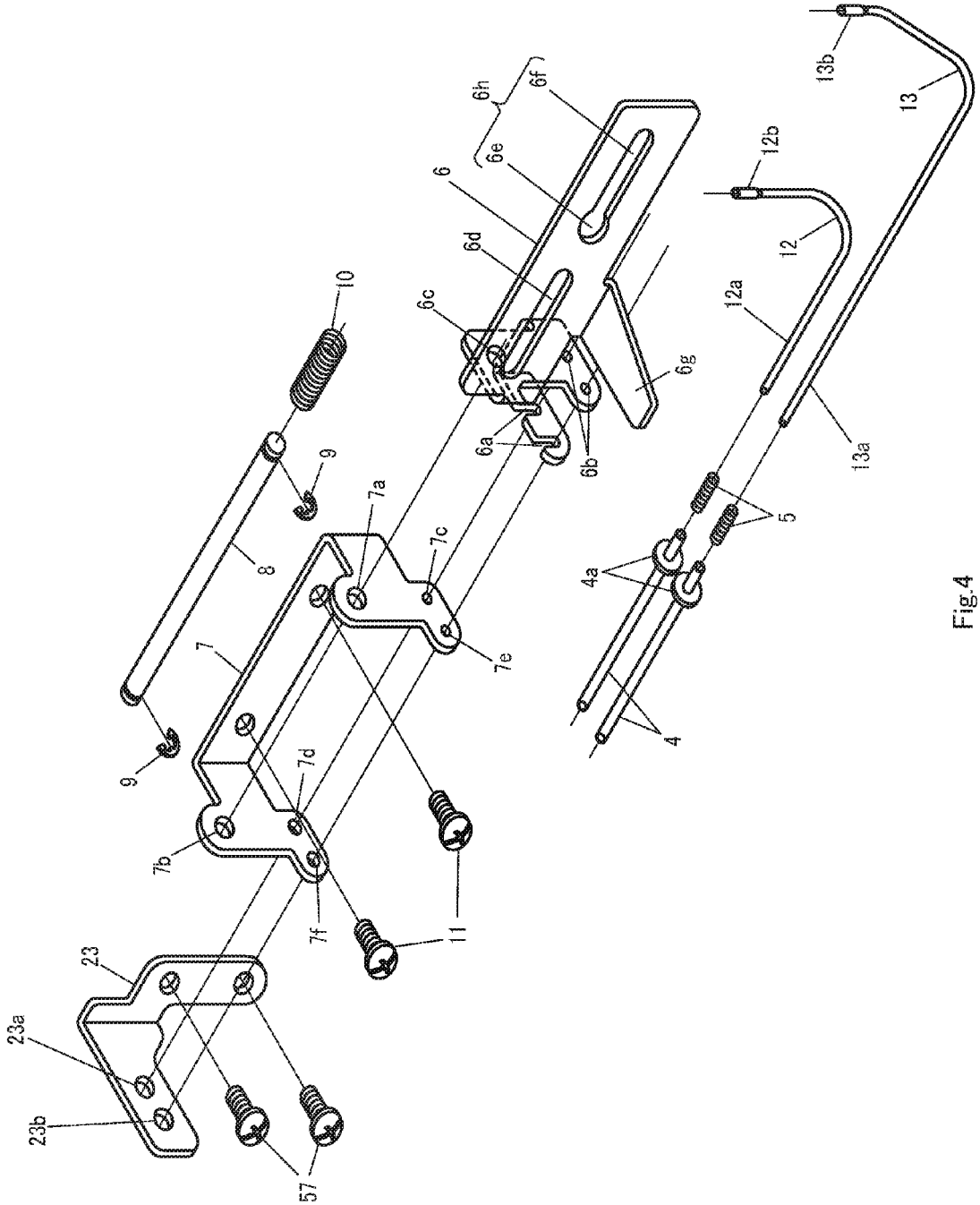
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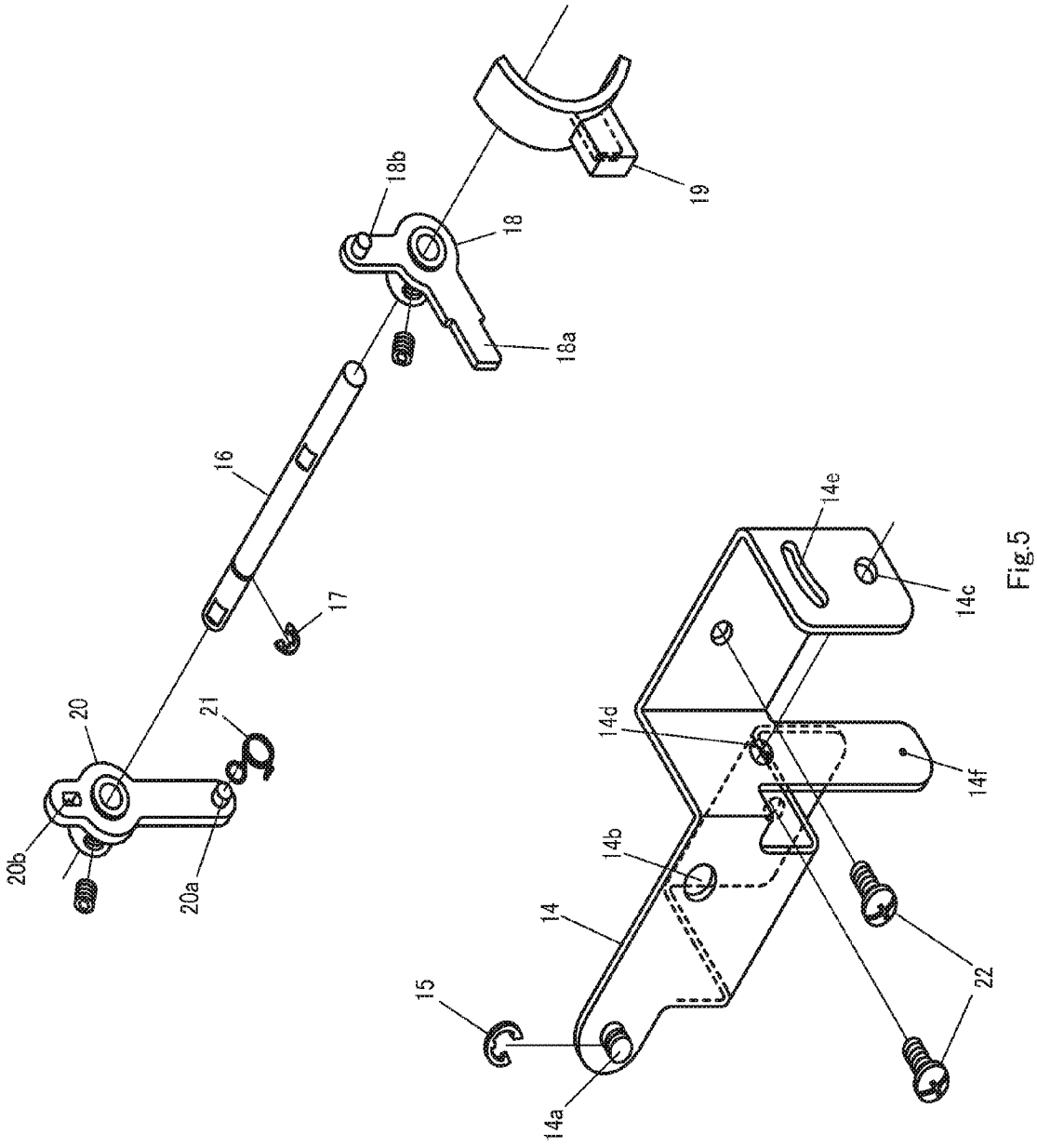
Fig.4



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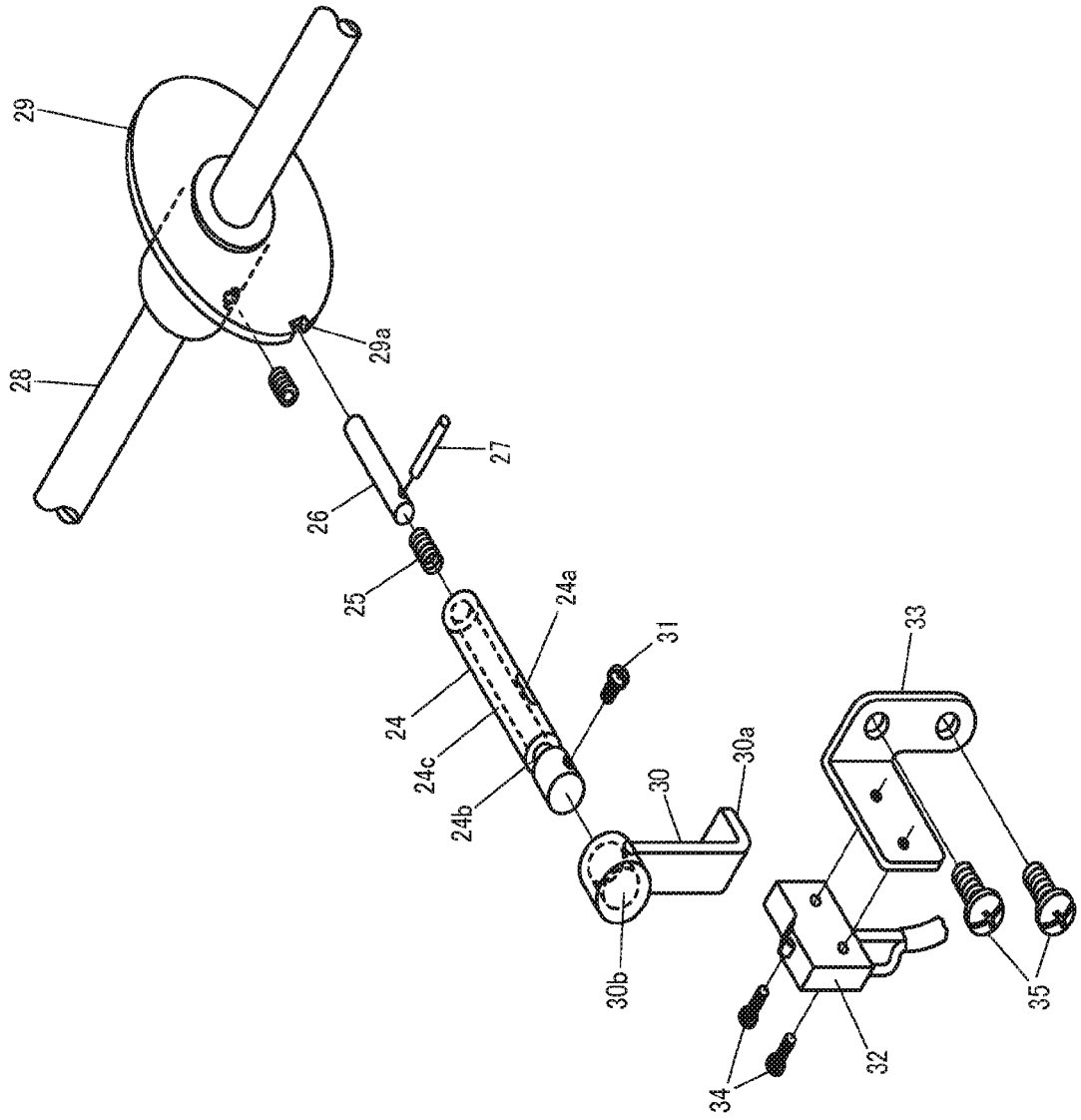

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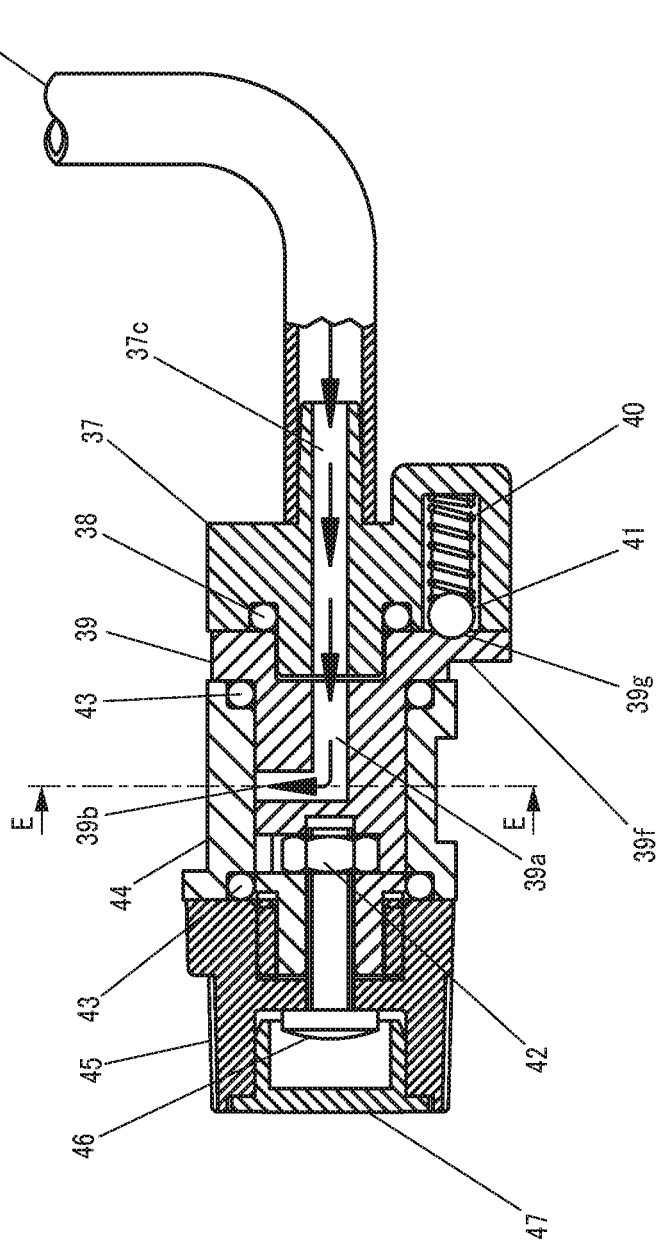

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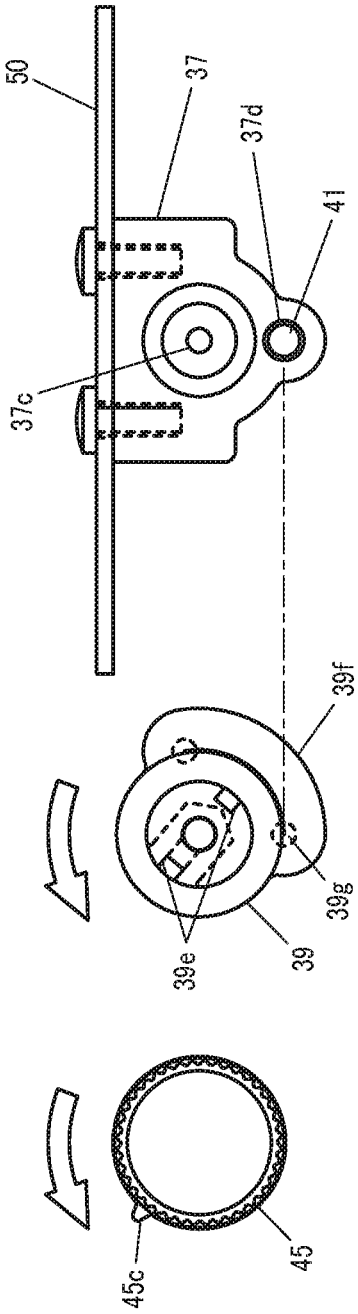

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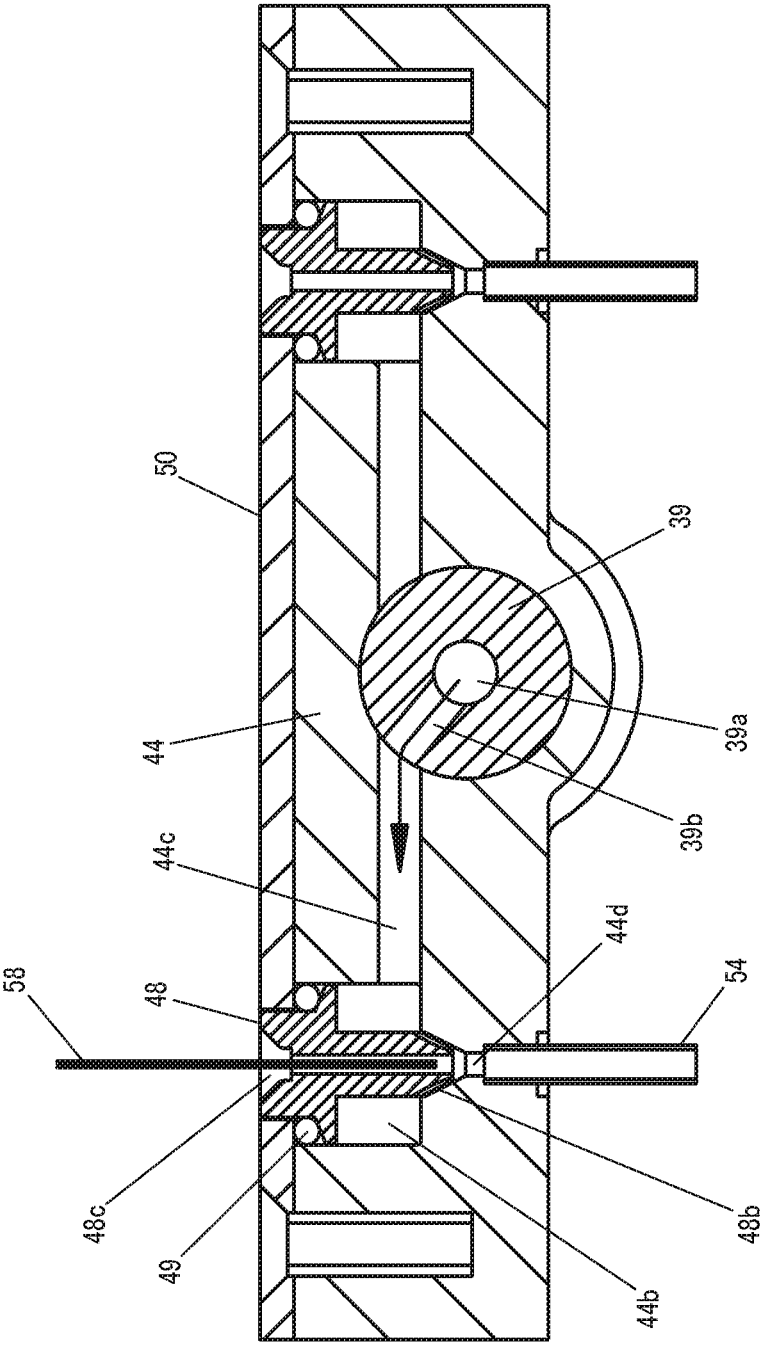
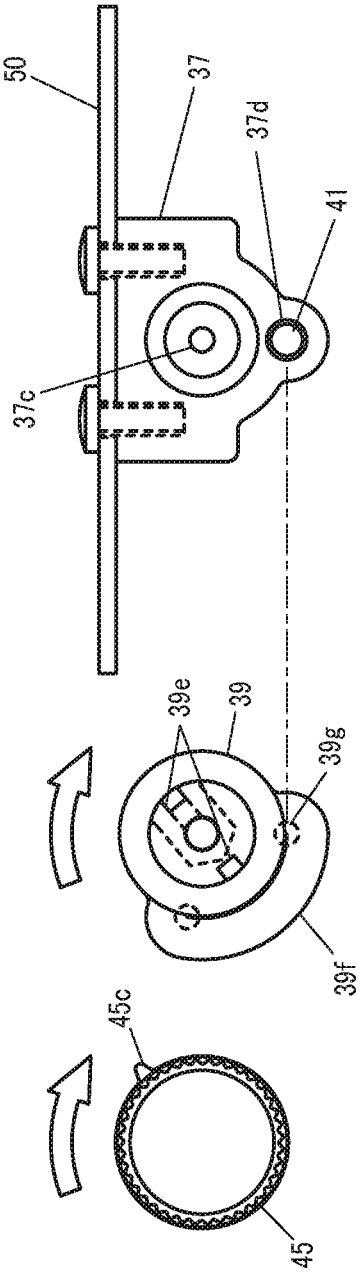


Fig.9



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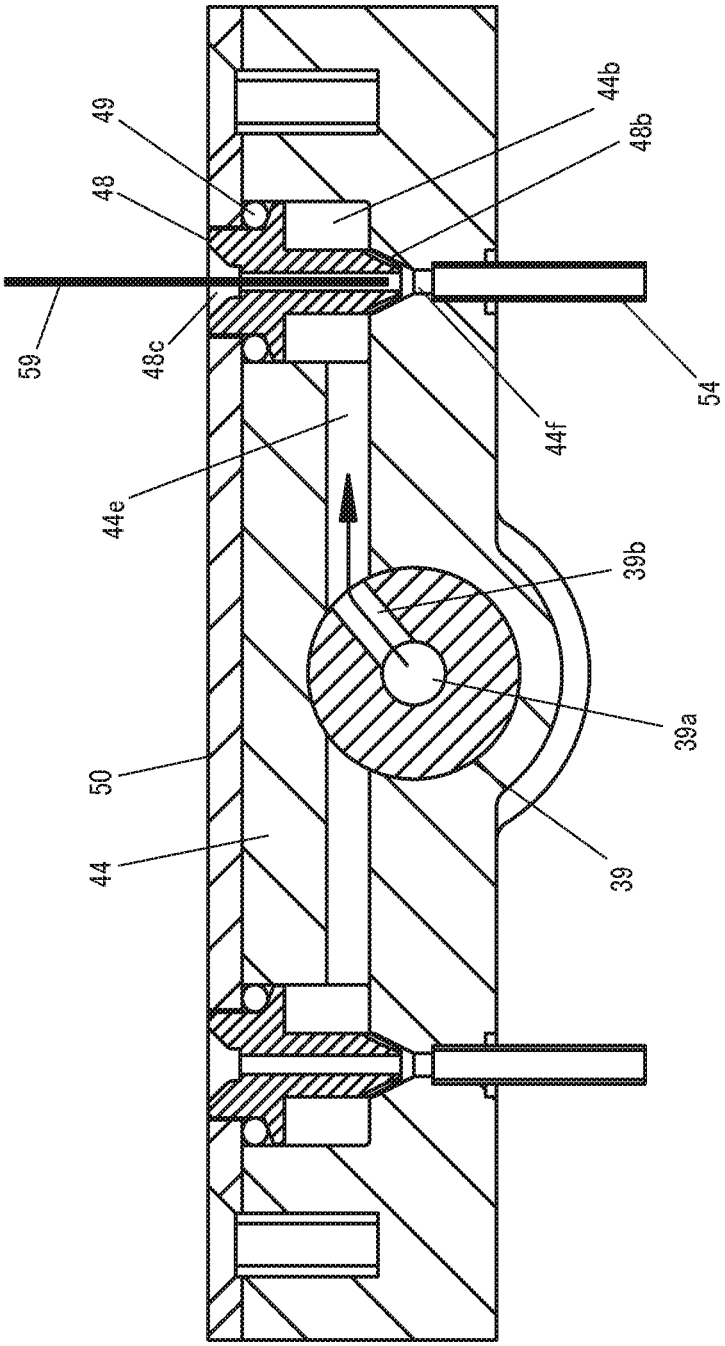


Fig.11

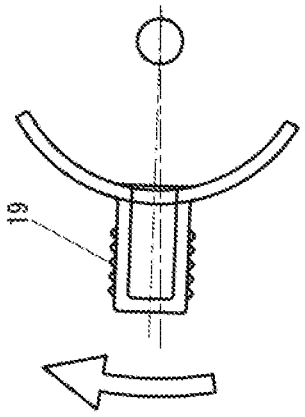
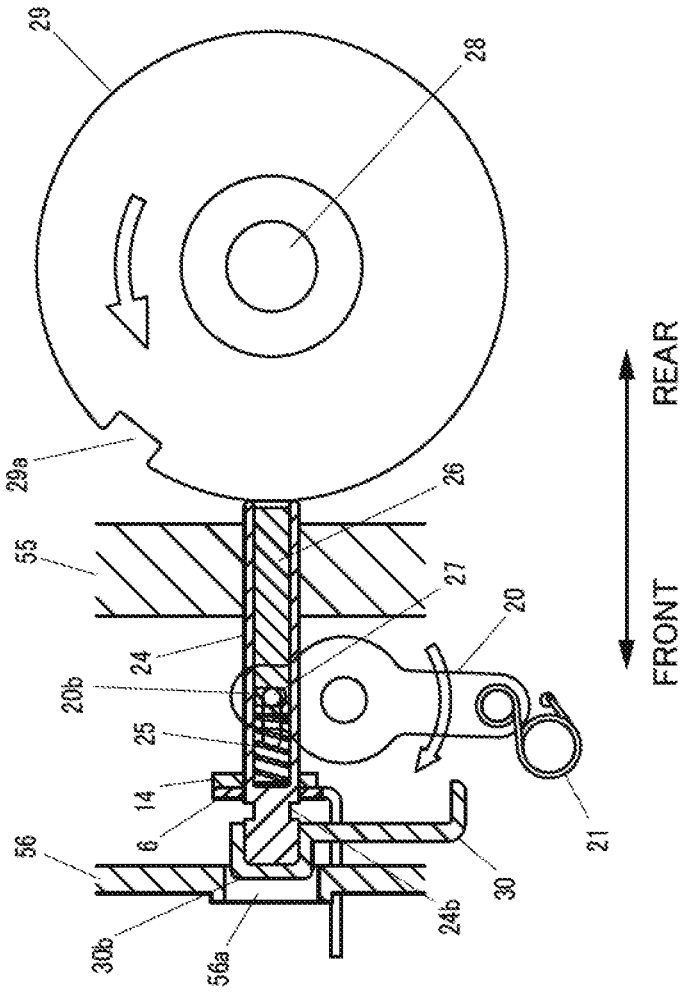


Fig.12A



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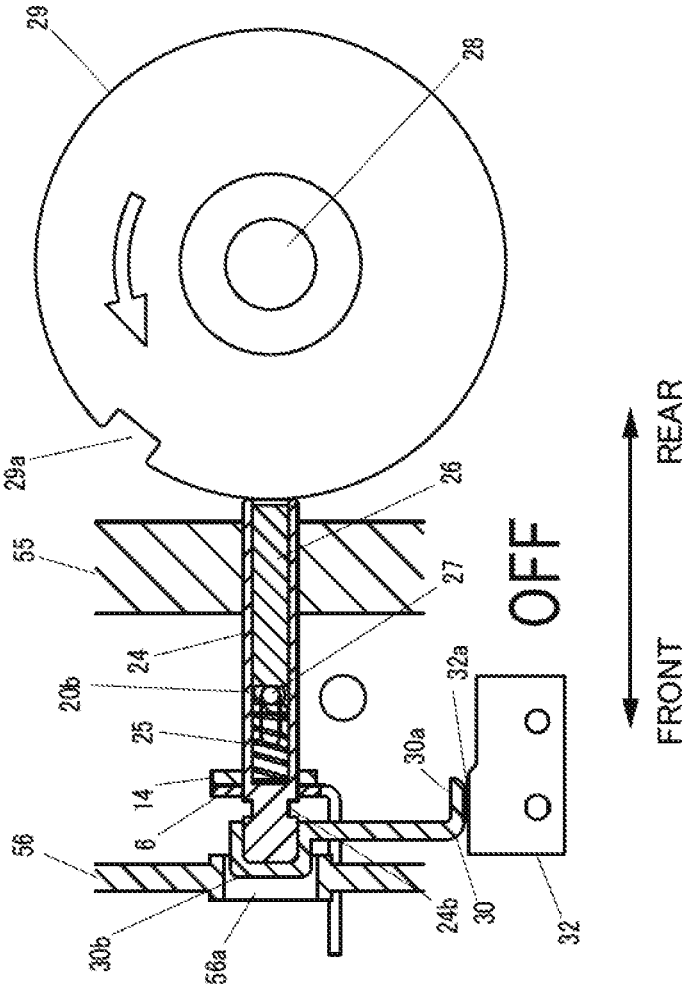
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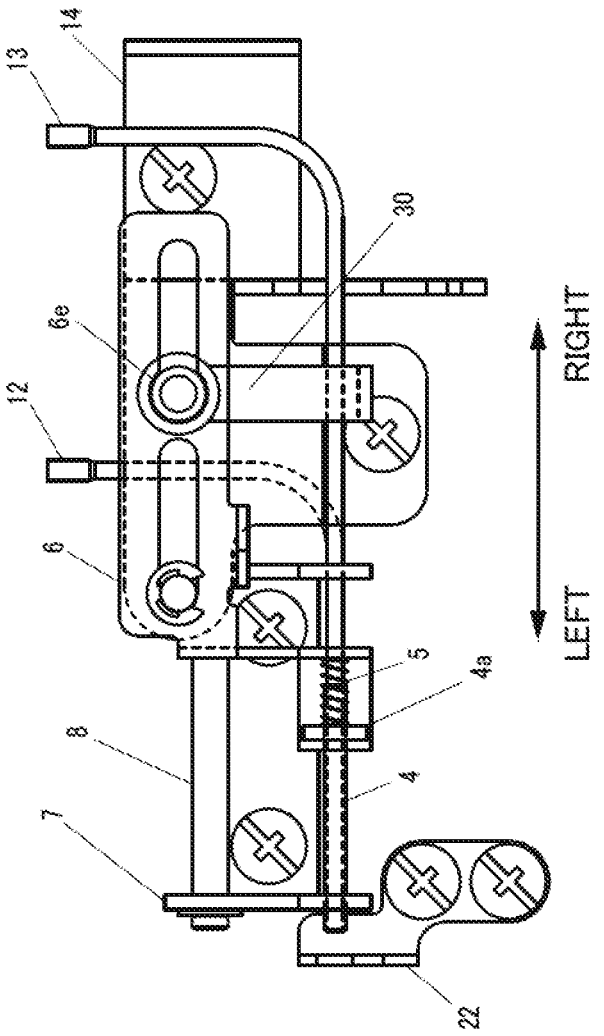
Fig.12C



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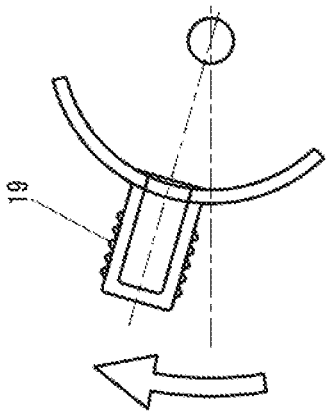
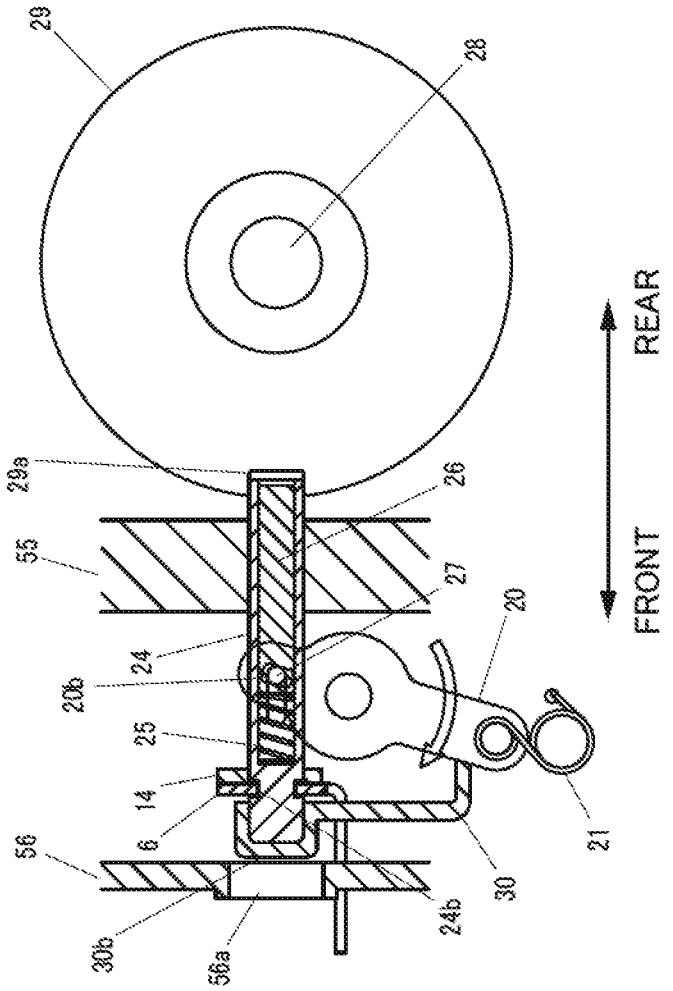


Fig.13A



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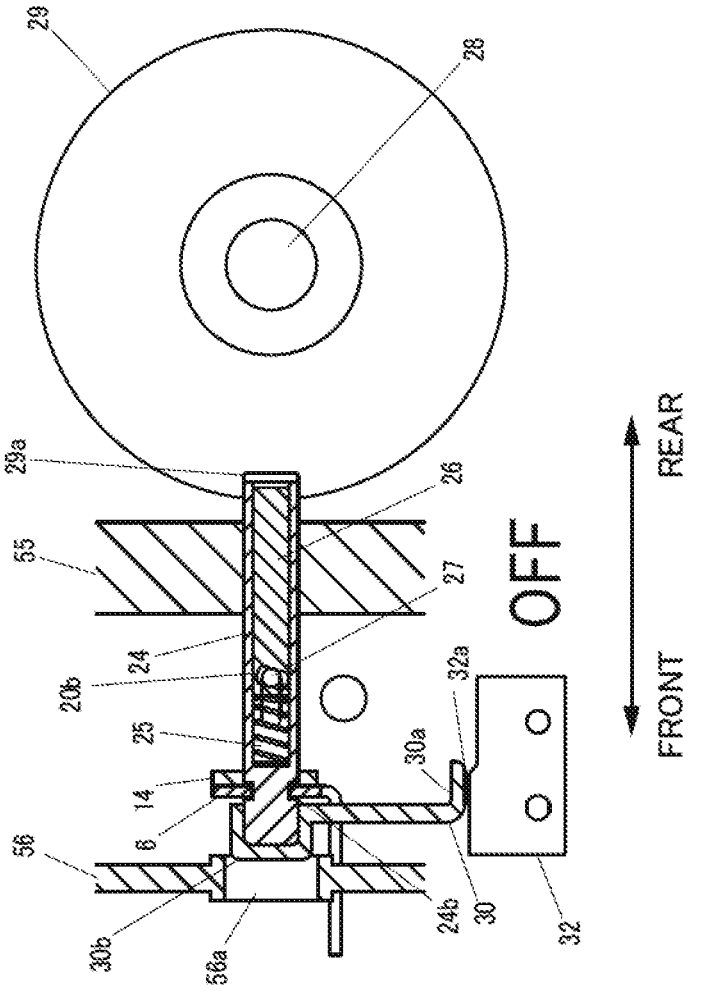
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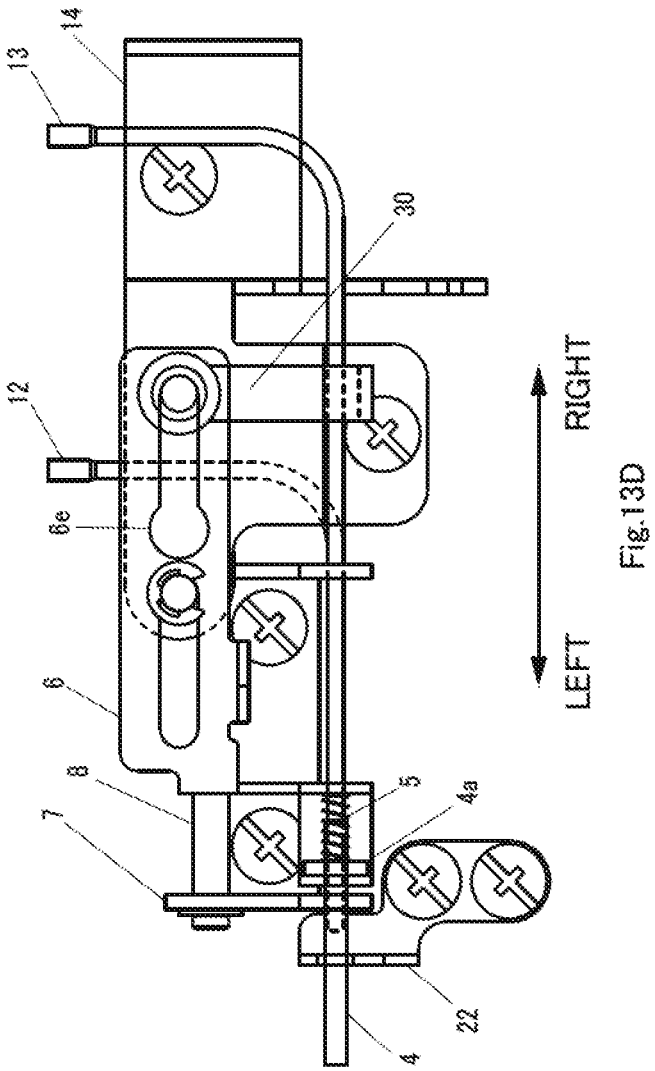
Fig.13C



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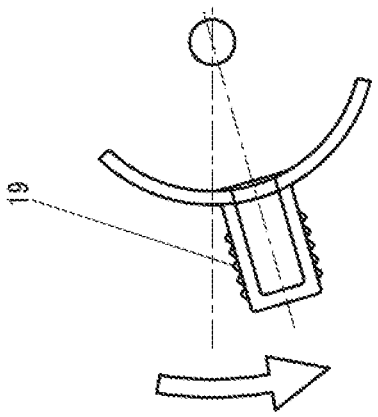

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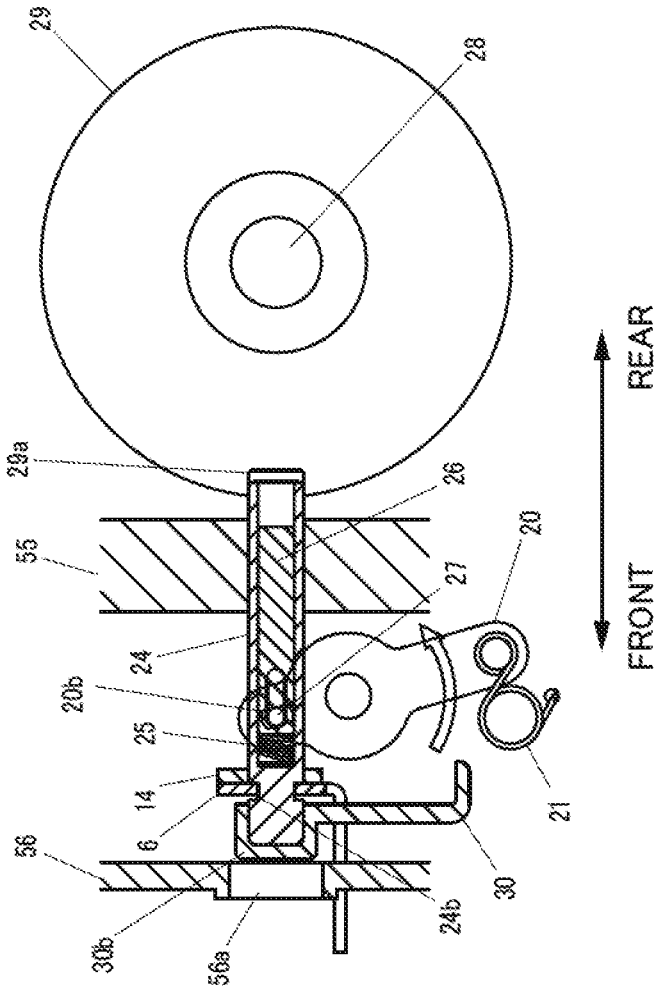

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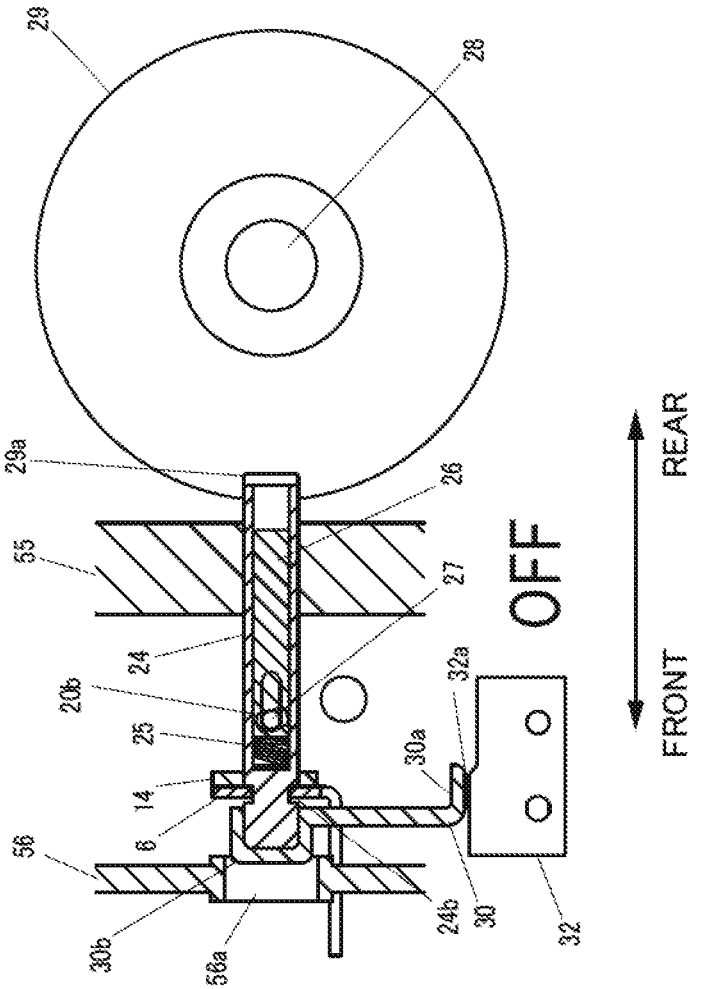
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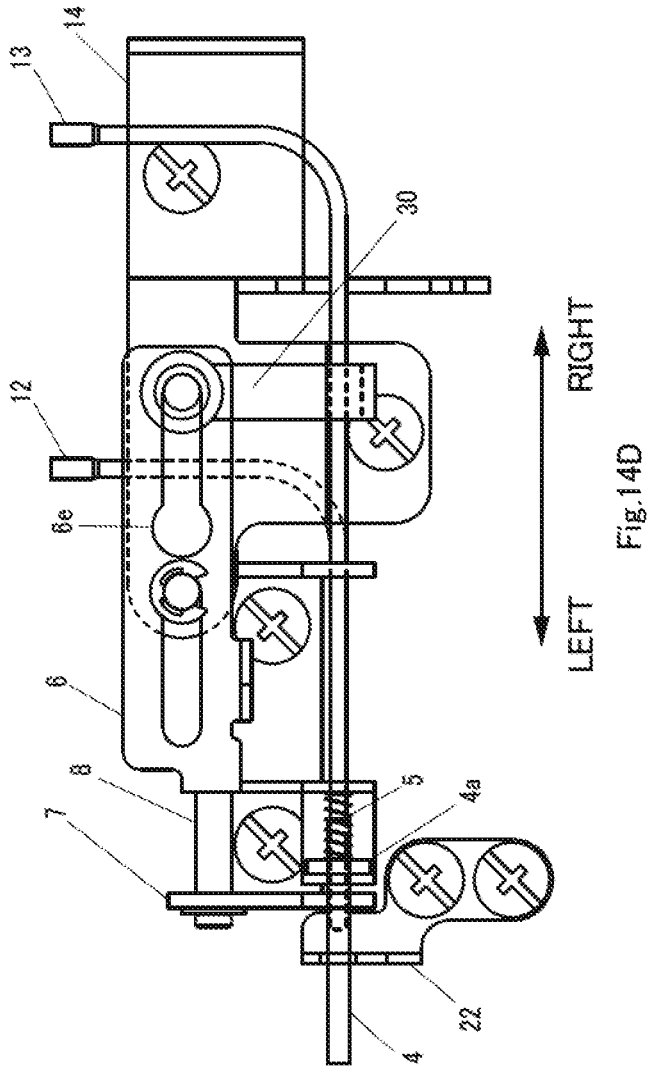
Fig.14C



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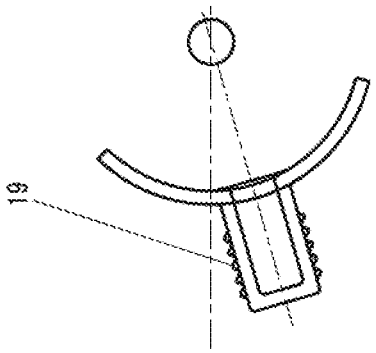
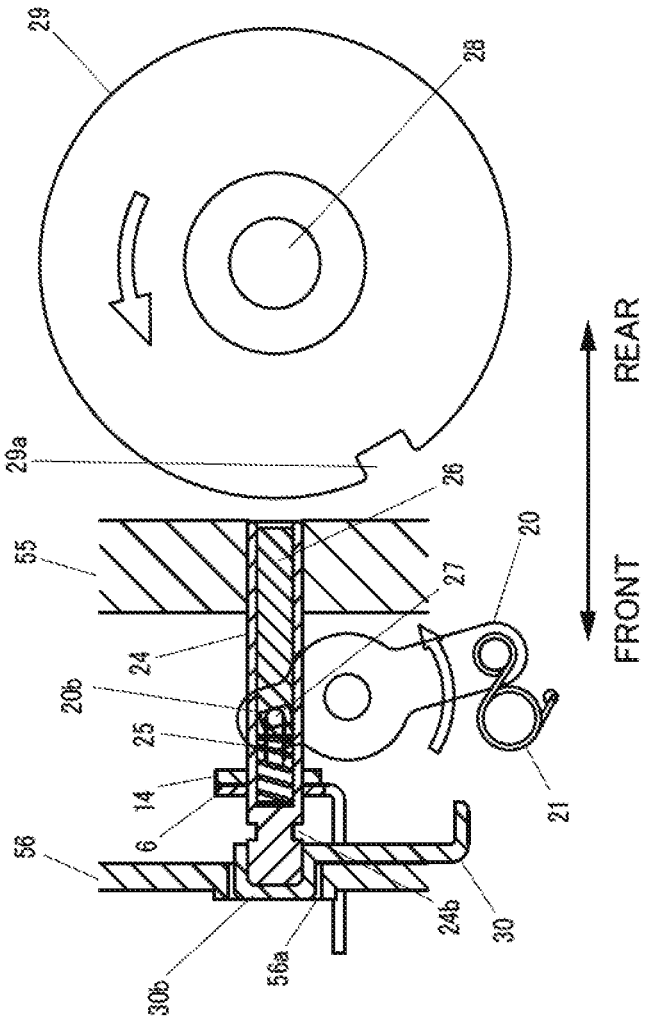


Fig.15A



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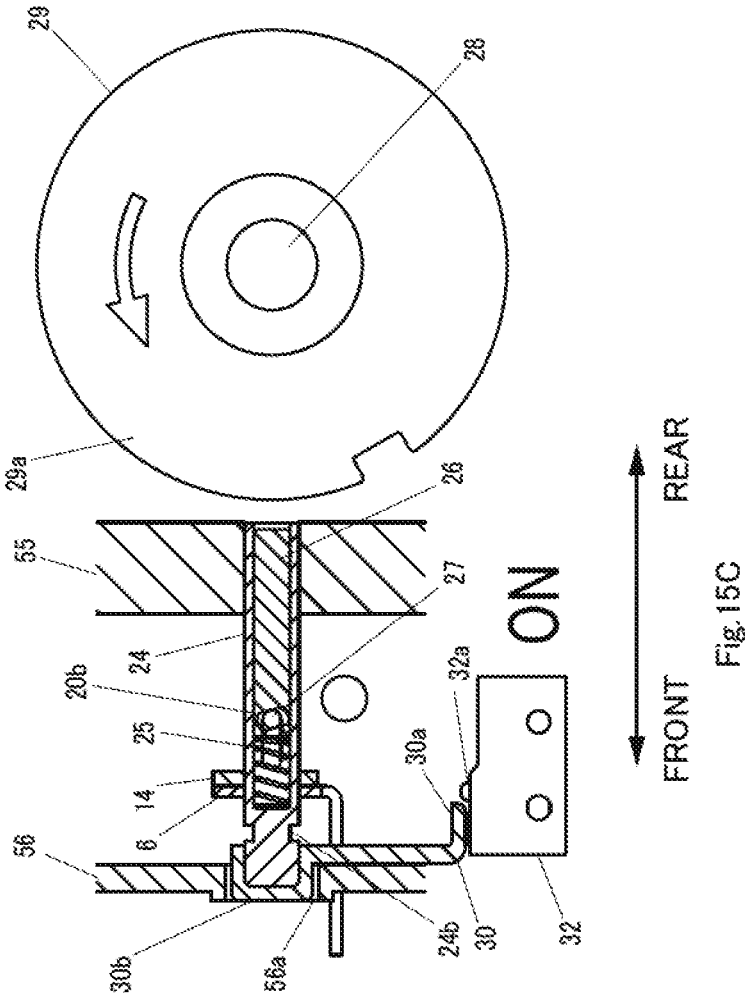
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Fig. 15C

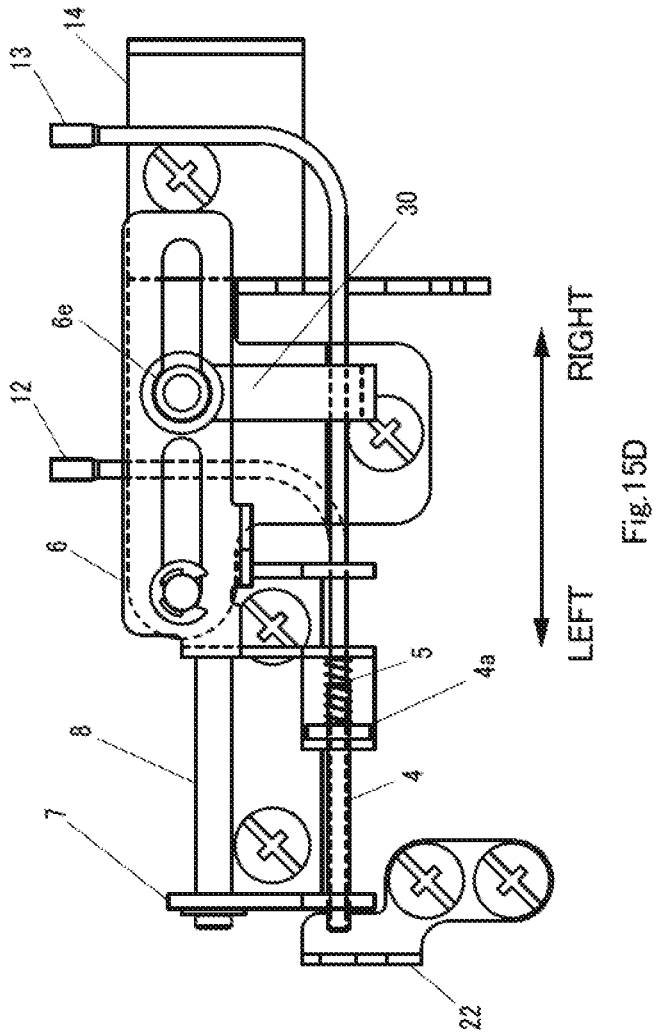

Fig.15D

OVERLOCK SEWING MACHINE

CROSS REFERENCE TO RELATED APPLICATIONS

This application is based on and claims the benefit of priority to Japanese Patent Application No. 2014-055392 filed on Mar. 18, 2014, the contents of which are hereby incorporated by reference in their entirety.

TECHNICAL FIELD

The present invention relates to an overlock sewing machine in which looper threads can be threaded to loopers utilizing power of air.

BACKGROUND ART

An overlock sewing machine is provided with a plurality of loopers, and since it is necessary to thread each of the loopers with respectively different looper threads, threading operations were troublesome.

Patent Document 1 discloses a device for threading a thread to a hollow looper point using compressed air.

Patent Document 2 discloses a compressed air path switching device corresponding to a plurality of loopers.

These techniques have enabled easy threading operations of looper threads to loopers.

On the one hand, the devices disclosed in Patent Document 1 and Patent Document 2 mainly included the following two issues.

The first issue is that when a threading enabled phase is detected and the phase is to be maintained, operations of pressing a fixing button and operations of rotating a thread take-up lever need to be performed simultaneously so that operations need to be made using both hands.

The second issue is that it can be hardly determined at a glance whether the overlock sewing machine is in a "sewing enabled state" or in a "threading state (or threading preparing state)".

In the device disclosed in Patent Document 3, there are provided a push button including a control pin and a control groove cam portion receiving the control pin, wherein the push button, the control groove cam portion and a main shaft are separately operable with one hand.

PRIOR ART LITERATURE

Patent Literature

[Patent Literature 1] Japanese Patent Laid-Open Publication No. 5-228285

[Patent Literature 2] Japanese Patent Laid-Open Publication No. 6-277383

[Patent Literature 3] Japanese Patent Laid-Open Publication No. 2013-338

SUMMARY OF THE INVENTION

However, in the device of Patent Document 3, a user needs to operate a member including the groove cam in a sliding manner, which lead to negative impression of operability. More particularly, in the device of Patent Document 3, large load changes are caused when the control pin runs onto a plurality of cam positions, and these load changes are directly caught by the user. Particularly for users who operate this device for the first time, there were cases in which they felt uneasy whether they should proceed with further operations since sliding of the operating member felt suddenly heavier.

Further, the device of Patent Document 3 can be hardly determined at a glance whether the overlock sewing machine is in a "sewing enabled state" or in a "threading state (or threading preparing state)".

One or more embodiments of the present invention provides an overlock sewing machine in which looper threading operations to loopers can be performed with one hand with favorable operation feelings and in which it is easy to determine whether it is in a sewing enabled state or not.

Embodiment (1): One or more embodiments of the present invention relate to an overlock sewing machine comprising at least one looper including an receiving opening for receiving a looper thread and having a hollow structure through which the looper thread passes; a thread inserting opening into which the looper thread is inserted that is to be inserted to the looper; a looper conduction pipe that guides the looper thread inserted into the thread inserting opening towards the receiving opening; a slide pipe provided between the looper conduction pipe and the receiving opening and which one end is fitted to the looper conduction pipe in a freely slidable manner while its other end is provided to be movable between a threading position at which it is connected to the receiving opening and a sewing executing position at which the other end is separated from the receiving opening; a slide member which is a member that holds the slide pipe and that moves between the threading position and the sewing executing position together with the slide pipe, having a long hole portion that extends along the moving direction and a wide hole portion that is formed in connection with the long hole portion and which width is formed to be larger than the width of the long hole portion; a slide member spring for urging the slide member and the slide pipe towards the receiving opening side; a main shaft that is rotationally driven; a main shaft fixing plate that is fixed to the main shaft and that includes a notch at an outer peripheral position corresponding to a threading phase at which the receiving opening is at a position at which it is connectable to the other end of the slide pipe; a first shaft which is an axial member which one end is provided to be movable between an engaging position at which it engages with the notch for fixing the main shaft at the threading phase and a retracted position at which it is completely separated from the main shaft fixing plate, comprising a small diameter portion and a large diameter portion at the other end thereof that respectively engage with the long hole portion and the wide hole portion of the slide member, wherein the position of the sliding member is maintained at each of the threading position and the sewing executing position through the engagement of the small diameter portion and the large diameter portion with the long hole portion and the wide hole portion; a second shaft that is provided to be relatively movable along an axial direction of the first shaft; a shaft spring for urging the first shaft and the second shaft in mutually separating directions; a shaft pin that is provided at the second shaft to project from the second shaft or that engages with the second shaft to be integrally movable in an axial direction of the second shaft; an engaging portion that is provided at the first shaft to engage with the shaft pin and/or the second shaft to receive force to move the first shaft towards the main shaft fixing plate side; a rocking lever portion including a main shaft fixing operating arm portion provided with a shaft pin engaging portion that engages with the shaft pin or with the shaft pin and a main shaft fixing lever portion provided to be operable by a user and being rockable within a specified range; and a main shaft fixing operating spring which urging direction is switched to both rocking directions of the rocking

lever portion by exceeding a neutral point through rocking operations of the rocking lever portion.

Embodiment (2): One or more embodiments of the present invention relate to an overlock sewing machine in which the overlock sewing machine of the above embodiment 1 comprises a casing member formed with an opening portion that is visible to at least the user at the time of operation, wherein a part of the first shaft and/or a part of an identifying member that moves integrally with the first shaft comes to a position at which it is exposed from the opening portion when the first shaft has moved to the retracted position to indicate that the sewing machine is in a sewing executable state in which the slide pipe and the slide member have moved to the sewing executing position so as to enable sewing.

Embodiment (3): One or more embodiments of the present invention relate to an overlock sewing machine in which the overlock sewing machine of the above embodiment 1 comprises a switch that allows driving of a motor for driving the main shaft only when the first shaft has moved to the retracted position so that the sewing machine is in a sewing executable state so as to enable sewing.

According to one or more embodiments of the present invention, it is possible to perform looper threading operations to the loopers by one hand with favorable operating feelings and it is also possible to easily determine whether it is in a sewing executable state or not.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** A perspective view of main portions for showing one embodiment of an overlock sewing machine according to the present invention.

FIG. **2** An exploded perspective view of an air flow path switching mechanism B.

FIG. **3** A perspective view showing an arrangement of a looper thread path C proximate of its right end portion by means of a state of seeing through a slide plate support **14**.

FIG. **4** An exploded perspective view proximate of a slide plate **6** of the looper thread path C.

FIG. **5** An exploded perspective view proximate of the slide plate support **14** of the looper thread path C.

FIG. **6** An exploded perspective view of a main shaft fixing mechanism D.

FIG. **7** A sectional view showing an inner structure of the air flow path switching mechanism B.

FIG. **8** A view showing a relationship of a coupling body **37**, a switching shaft **39** and a looper selecting nob **45** in a state in which the looper selecting nob **45** is operated to a side of performing threading of an upper looper thread **58** (left side) (hereinafter referred to as "upper looper threading state").

FIG. **9** A sectional view of the air path switching mechanism B cut at a position indicated by arrow E-E in FIG. **7** in the upper looper threading state.

FIG. **10** A view showing a relationship of the coupling body **37**, the switching shaft **39** and the looper selecting nob **45** in a state in which the looper selecting nob **45** is operated to a side of performing threading of a lower looper thread **59** (right side) (hereinafter referred to as "lower looper threading state").

FIG. **11** A sectional view of the air flow path switching mechanism B cut at the position indicated by arrow E-E in FIG. **7** in the lower looper threading state.

FIG. **12**A A view showing a fixing lever knob **19** in a standby state for switching to threading.

FIG. **12**B A view showing a relationship of a main shaft fixing operating arm **20**, a main shaft fixing outer shaft **24** and a main shaft fixing inner shaft **26** in the standby state for switching to threading.

FIG. **12**C A view showing a relationship between a motor switch cap **30** and a micro switch **32** in the standby state for switching to threading.

FIG. **12**D A view showing positions of the slide plate **6** and a slide pipe **4** in the standby state for switching to threading.

FIG. **13**A A view showing the fixing lever knob **19** in a threading enabled state.

FIG. **13**B A view showing a relationship of the main shaft fixing operating arm **20**, the main shaft fixing outer shaft **24** and the main shaft fixing inner shaft **26** in the threading enabled state.

FIG. **13**C A view showing a relationship between the motor switch cap **30** and the micro switch **32** in the threading enabled state.

FIG. **13**D A view showing positions of the slide plate **6** and the slide pipe **4** in the threading enabled state.

FIG. **14**A A view showing the fixing lever knob **19** in a standby state for cancelling threading.

FIG. **14**B A view showing a relationship of the main shaft fixing operating arm **20**, the main shaft fixing outer shaft **24** and the main shaft fixing inner shaft **26** in the standby state for cancelling threading.

FIG. **14**C A view showing a relationship between the motor switch cap **30** and the micro switch **32** in the standby state for cancelling threading.

FIG. **14**D A view showing positions of the slide plate **6** and the slide pipe **4** in the standby state for cancelling threading.

FIG. **15**A A view showing the fixing lever knob **19** in a sewing executable state.

FIG. **15**B A view showing a relationship of a main shaft fixing operating arm **20**, a main shaft fixing outer shaft **24** and a main shaft fixing inner shaft **26** in the sewing executable state.

FIG. **15**C A view showing a relationship between the motor switch cap **30** and the micro switch **32** in the sewing executable state.

FIG. **15**D A view showing positions of the slide plate **6** and the slide pipe **4** in the sewing executable state.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Best modes for embodying the present invention will now be explained while referring to the drawings and others.

<First Embodiment>

FIG. **1** is a perspective view of main portions for showing an embodiment of an overlock sewing machine according to the present invention.

In this respect, each of the drawings including FIG. **1** indicated hereinafter are schematically illustrated drawings and sizes and shapes of respective portions are shown in suitably exaggerated form for ease of understanding.

Further, while explanations are made upon indicating specific numerical values, shapes and materials in the following explanations, they may be suitably changed.

Moreover, for ease of understanding and for convenience sake, explanations will be made by suitably using the six directions of front (or near), rear (or back, behind), left, right, up and down as indicated by arrows in FIG. **1**. However, these directions are not to limit the arrangement of the invention.

In the present embodiment, explanations will be made by giving a case of an overlock sewing machine comprising two loopers (upper looper **1**, lower looper **2**). However, the

present invention is also applicable to sewing machines in which threading to one or more than three loopers is performed.

The overlock sewing machine according to the present embodiment includes a looper portion A, an air flow path switching mechanism B, a looper thread path C and a main shaft fixing mechanism D as main arrangements as indicated by one dot chain lines in FIG. **1**. In this respect, while the overlock sewing machine further comprises needles, a motor and various driving mechanisms, details thereof will be omitted here.

The looper portion A comprises an upper looper **1** and a lower looper **2** of hollow structure for receiving an upper looper thread **58** and a lower looper thread **59** that are sent by means of the air flow path switching mechanism B and the looper thread path C. The upper looper **1** and the lower looper **2** respectively include an upper looper receiving opening **1***a* and a lower looper receiving opening **2***a* for receiving the respective looper threads.

The upper looper receiving opening **1***a* communicates up to an upper looper point **1***c* via a pipe-like member **1***b*. The lower looper receiving opening **2***a* communicates up to a lower looper point **2***c* via a pipe-like member **2***b*. A looper thread take-up **3** includes an upper looper thread hole **3***a* and a lower looper thread hole **3***b*. The upper looper **1** and the lower looper **2** perform reciprocating movements while keeping intersection timings with a needle (not shown) that is vertically moved through rotation of a main shaft **28** that is driven by a motor (not shown).

FIG. **2** is an exploded perspective view of the air flow path switching mechanism B.

The air flow path switching mechanism B is a mechanism for switching a flow path of compressed air that is supplied to a tube **36** so as to switch between threading of the upper looper thread **58** and threading of the lower looper thread **59**.

Compressed air that is generated by a compressed air generator (not shown) is supplied to the tube **36**. One end of the tube **36** is connected to a hollow boss **37***a* of a coupling body **37**. A hollow boss **37***b* provided on the other end side of the hollow boss **37***a* is attached with an O ring **38** and is fit to a back portion of a switching shaft **39**.

A hollow hole **37***c* piercing through the hollow bosses **37***a*, **37***b* lets the compressed air from the tube **36** flow through.

A concave portion **37***d* is formed on a side of the coupling body **37** opposing the switching shaft **39** (front side), wherein a click spring **40** is fitted in the back thereof while a click steel ball **41** is fitted in front thereof. A part of the click steel ball **41** protrudes from a surface of the coupling body **37**. The switching shaft **39** includes a hollow hole **39***a* (see FIG. **8** and FIG. **9**) corresponding to the hollow hole **37***c* of the coupling body **37** and is in succession with a hole **39***b* on an outer peripheral surface of an axial portion of the switching shaft **39**. An angular hole **39***c* for accommodating a hexagonal nut **42** is disposed at an axial portion of the switching shaft **39**, and a central hole **39***d* formed on an end surface on the near side of the switching shaft **39** extends up to the angular hole **39***c*. Two angular grooves **39***e* are formed at suitable length from the end surface on the near side of the switching shaft **39** along an axial direction.

A flange **39***f* is formed at a rear end of the switching shaft **39** in a fan-like manner. A rear surface of the flange **39***f* includes two hemispherical concave portions **39***g* (see FIG. **7** and FIG. **9**) at a specified interval at positions corresponding to the concave portions **37***d* of the coupling body **37**.

The switching shaft **39** is arranged in that an O ring **43** is attached to its axial portion and in that it pierces through a central hole **44***a* of a branching body **44**. The switching shaft **39** piercing through the branching body **44** is attached with the O ring **43** from the near side, and two angular protrusions **45***a* of a looper selecting knob **45** and the two angular grooves **39***e* of the switching shaft **39** are in mesh and fit together. In this respect, the looper selecting knob **45** disposed such that its back surface side is visible is added in FIG. **2**. The switching shaft **39** and the looper selecting knob **45** are coupled and fixed by means of a screw **46** passing through a central through hole **45***b* of the looper selecting knob **45** and the hexagonal nut **42** inserted into the switching shaft **39**. A cap **47** serves as a lid from in front of the looper selecting knob **45**, and the screw **46** is hidden from the surface.

Two concave portions **44***b* are disposed on an upper surface of the branching body **44**, and two thread inserting openings **48** are accommodated in these concave portions **44***b*. The branching body **44** is fixed to a branching base plate **50** by means of screws **51** in a condition in which O rings **49** are attached to upper portion bosses **48***a* of the thread inserting openings **48**. The upper portion bosses **48***a* of the thread inserting openings **48** are exposed from round holes **50***a* of the branching base plate **50** so as to enable insertion of the upper and lower looper threads. In this respect, the inner structure of the branching body **44** is shown in FIG. **8**, FIG. **9** and others.

The coupling body **37** is fixed to the branching base plate **50** by means of screws **52**. With this arrangement, compressed air generated by the compressed air generator (not shown) reaches the branching body **44** upon passing the tube **36**, the coupling body **37** and the switching shaft **39**.

The branching base plate **50** is fixed to a main body of the sewing machine (not shown) or a unit base **55** by means of screws **53**.

FIG. **3** is a perspective view showing an arrangement of the looper thread path C proximate of its right end portion by means of a state of seeing through a slide plate support **14**.

FIG. **4** is an exploded perspective view proximate of a slide plate **6** of the looper thread path C.

FIG. **5** is an exploded perspective view proximate of the slide plate support **14** of the looper thread path C.

The slide pipe **4** receives the slide pipe spring **5** at its flange portion **4***a* and is inserted into a U groove **6***a* of the slide plate **6** using the flange portion **4***a* as a strike plate. The slide pipe **4** is fitted to an upper looper conduction pipe **12** and a lower looper conduction pipe **13**, respectively, in a freely sliding manner. The slide pipe **4** moves between a threading position and a sewing executing position following movements of the slide plate **6**.

The slide pipe spring **5** fits to the slide pipe **4** and press-contacts the slide pipe **4** against the upper looper receiving opening **1***a* and the lower looper receiving opening **2***a* when moving the slide pipe **4** to the threading position.

The slide plate (slide member) **6** includes **2** round holes **6***b* on an opposite side corresponding to the two U grooves **6***a*. The portion of the slide plate **6** including the U grooves **6***a* and the round holes **6***b* is disposed on an inner region (region pinched by opposing portions to be described later) of a looper pipe supporting plate **7**. The slide plate **6** holds the slide pipe **4** and moves between the threading position and the sewing executing position together with the slide pipe **4**.

The looper pipe supporting plate **7** is formed to have a shape in which its opposing portions, which are provided on both sides of portions extending in lateral directions to oppose each other, are respectively bent frontward to stand up (so-called U-shaped form). The looper pipe supporting plate **7** includes through holes **7***a*, **7***b* at the opposing portions. The slide plate **6** is formed with a round hole **6***c* corresponding to

the through holes **7***a*, **7***b* on the same surface as the above-mentioned two round holes **6***b*.

A supporting plate shaft **8** pierces through the through holes **7***a*, **7***b* of the looper pipe supporting plate **7** and the round hole **6***c* of the slide plate **6**, and is fixed to the looper pipe supporting plate **7** by fastening E-shaped snap rings **9** to both ends thereof. The supporting plate shaft **8** maintains a supporting plate shaft spring **10** between the round hole **6***c* of the slide plate **6** and the through hole **7***a* of the looper pipe supporting plate **7**. Since the looper pipe supporting plate **7** is fixed to the main body of the sewing machine (not shown) or the unit base **55** by means of screws **11**, the slide plate **6** is continuously urged in the a left direction by means of the supporting plate shaft spring **10**.

The supporting plate shaft spring **10** constantly urges the slide plate **6** and the slide pipe **4** in the left direction and serves as a driving source for moving the slide plate **6** and the slide pipe **4** in the left direction at the time of switching threading.

A linear portion **12***a* of the upper looper conduction pipe **12** pierces through a right-side surface hole **7***c* of the looper pipe supporting plate **7** and the round hole **6***b* of the slide plate **6**, pierces further through the slide pipe spring **5** and the slide pipe **4** and pierces up to a left-side surface hole **7***d* of the looper pipe supporting plate **7** together with the slide pipe **4**.

A linear portion **13***a* of the lower looper conduction pipe **13** pierces through a right-side surface hole **7***e* of the looper pipe supporting plate **7** and the round hole **6***b* of the slide plate **6**, pierces further through the slide pipe spring **5** and the slide pipe **4** and pierces up to a left-side surface hole **7***f* of the looper pipe supporting plate **7** together with the slide pipe **4**.

The slide plate **6** includes a long hole **6***d* and a heteromorphic long hole **6***h*.

The heteromorphic long hole **6***h* includes a long hole portion **6***f* extending along a moving direction of the slide plate **6** (lateral direction) and a wide hole portion **6***e* that is formed in connection with the long hole portion **6***f* and to have a width that is formed to be larger than the width of the long hole portion **6***f*.

A slide plate support **14** is fixed to the main body of the sewing machine (not shown) or the unit base **55** by means of screws **22**. The slide plate support **14** holds the slide plate **6** and the main shaft fixing outer shaft **24**, and it further holds a main shaft fixing operating shaft **16**, the main shaft fixing operating arm **20** and a main shaft fixing lever **18**.

The slide plate support **14** is provided with a pin with E grooves **14***a* on one end thereof. The slide plate support **14** holds the slide plate **6** in a freely sliding manner by being fixed by the E-shaped snap ring **15** in a condition in which the long hole **6***d* of the slide plate **6** and the pin with E grooves **14***a* are fitted. A projecting knob portion **6***g* is formed in substantially the center of the slide plate **6**. When the projecting knob portion **6***g* is pinched and operated by the user, the slide plate **6** can be moved to the right against the supporting plate shaft spring **10**.

The slide plate support **14** includes the round hole **14***b* at substantially the center thereof and the main shaft fixing outer shaft **24** pierces through the round hole **14***b*. The slide plate support **14** includes the through holes **14***c*, **14***d* on a right half portion thereof. The main shaft fixing operating shaft **16** pierces through the through holes **14***c*, **14***d* and the main shaft fixing operating shaft **16** is provided at the slide plate support **14** to be freely rotating by means of the E-shaped snap ring **17**.

The main shaft fixing lever **18** is fixed at the main shaft fixing operating shaft **16** inside of the right-side surface of the slide plate support **14** and is held to be freely rotating integrally with the main shaft fixing operating arm **20** upon eliminating backlash in a thrust direction in coaction with the E-shaped snap ring **17**.

A fixing lever knob **19** is fixed at an arm **18***a* extending to the near side of the main shaft fixing lever **18** (main shaft fixing lever portion) to enable operation of the fixing lever knob **19** by the user at the time of switching between the threading state and the sewing executing state. A pin **18***b* is disposed on another arm extending upward of the main shaft fixing lever **18**. The pin **18***b* fits into an arc-shaped long hole **14***e* located on a right end of the slide plate support **14** in a freely rocking manner. Through this fitting of the arc-shaped long hole **14***e* and the pin **18***b*, a rocking range of the main shaft fixing lever **18** is restricted.

The main shaft fixing operating arm (main shaft fixing operating arm portion) **20** is fixed to a left end of the main shaft fixing operating shaft **16**. The main shaft fixing operating arm **20** performs rocking movements integrally with the main shaft fixing lever **18** through the main shaft fixing operating shaft **16**. A pin **20***a* is disposed at one end of the main shaft fixing operating arm **20**, and a main shaft fixing operating spring **21** is suspended between the pin and a small hole **14***f* of the slide plate support **14**. The main shaft fixing operating spring **21** alternately performs urging movements in bipolar directions exceeding the neutral point through the rocking movements of the main shaft fixing operating arm **20**. There is further provided a shaft pin engaging portion **20***b* formed to have a long hole shape at one end of the main shaft fixing operating arm **20**. A fixing inner shaft pin **27** to be described later is engaged with the shaft pin engaging portion **20***b*. The main shaft fixing operating arm **20** moves a main shaft fixing inner shaft **26** and the main shaft fixing outer shaft **24** forward and backward with the shaft pin engaging portion **20***b* pressing the fixing inner shaft pin **27**.

The main shaft fixing operating arm **20** is arranged in that it is alternately urged to the near side and the back side exceeding the neutral point through the action of the main shaft fixing operating spring **21**. The main shaft fixing operating arm **20** is restricted in its rocking range through the fitting of the arc-shaped long hole **14***e* of the slide plate support **14** and the pin **18***b* of the main shaft fixing lever **18**.

In this respect, in the present embodiment, the rocking lever portion provided to be rocking within a specified range is comprised of the main shaft fixing operating shaft **16**, the main shaft fixing lever **18**, the fixing lever knob **19** and the main shaft fixing operating arm **20** as described above. However, the rocking lever portion could also be arranged by integrating a part or all of these parts.

A looper thread take-up guide **23** is disposed on a left end of the looper thread path C. The looper thread take-up guide **23** is formed with two round holes **23***a*, **23***b* at positions corresponding to the left-side surface holes **7***d*, **7***f* of the looper pipe supporting plate **7**.

The looper thread take-up guide **23** is fixed to the main body of the sewing machine (not shown) or the unit base **55** by means of screws **57**.

FIG. **6** is an exploded perspective view of the main shaft fixing mechanism D.

The main shaft fixing outer shaft (first shaft) **24** fit to the round hole **14***b* of the slide plate support **14** has a hollow inner diameter portion, wherein a fixing inner shaft spring (shaft spring) **25** and the main shaft fixing inner shaft (second shaft) **26** are inserted into the hollow portion. Accordingly, the main shaft fixing inner shaft **26** is relatively movable along an axial direction of the main shaft fixing outer shaft **24**. The main shaft fixing inner shaft **26** moves forward and backward through rocking movements of the main shaft fixing operat-

ing arm **20** through the fixing inner shaft pin **27** to be described later. The fixing inner shaft spring **25** urges the main shaft fixing outer shaft **24** and the main shaft fixing inner shaft **26** in mutually separating directions. With this arrangement, the fixing inner shaft spring **25** functions as an urging member for maintaining an intermediate position of the main shaft fixing outer shaft **24**.

The fixing inner shaft pin (shaft pin) **27** is fixed such that it projects sideward to a tip end on the near side of the main shaft fixing inner shaft **26** through a side surface long hole (engaging portion) **24***a* of the main shaft fixing outer shaft **24**. The fixing inner shaft pin **27** has a function of transmitting rocking movements of the main shaft fixing operating arm **20** to the main shaft fixing inner shaft **26**. The fixing inner shaft pin **27** is movable in front and rear directions within a range in which the side surface long hole **24***a* of the main shaft fixing outer shaft **24** is formed, and the main shaft fixing inner shaft **26** moves within the main shaft fixing outer shaft **24** in accordance therewith. The side surface long hole **24***a* also has a function as an engaging portion that engages with the fixing inner shaft pin **27** to receive force of moving the main shaft fixing outer shaft **24** to a main shaft fixing plate **29** side.

The main shaft fixing plate **29** fixed to the main shaft **28** is disposed on an axial central line of the main shaft fixing outer shaft **24**. A notch **29***a* that can fit with the main shaft fixing outer shaft **24** is disposed at a specified phase (corresponding to the threading phase) on an outer periphery of the main shaft fixing plate **29**. When the main shaft fixing outer shaft **24** reaches a final position (engaging position), the main shaft fixing outer shaft **24** engages with the notch **29***a* to fix the main shaft **28** at the threading phase.

A motor switch cap (identification member) **30** is fastened at a tip end on the near side of the main shaft fixing outer shaft **24** by means of a screw **31**. The motor switch cap **30** moves back and forth integrally with the main shaft fixing outer shaft **24**.

The motor switch cap **30** includes a switch contacting surface **30***a* at a tip end of a downwardly extended arm thereof.

A micro switch (switch) **32** is disposed at a lower portion of the motor switch cap **30**. The micro switch **32** is fixed at a switch mounting plate **33** by means of screws **34**. The switch mounting plate **33** is fixed to the main body of the sewing machine or the unit base **55** by means of screws **35**.

A circuit of the present embodiment (not shown) is arranged in that a motor driving circuit is switched ON only when the main shaft fixing outer shaft **24** is at a foremost position which is a retracted position in which it is completely separated from the main shaft fixing plate **29**, that is, when the motor switch cap **30** is at a foremost position. This state is a state in which the slide plate **6** and the slide pipe **4** have moved to the right and corresponds to the sewing executable state.

The main shaft fixing outer shaft **24** comprises a small diameter portion **24***b* and a large diameter portion **24***c* that respective engage with the long hole portion **6***f* and the wide hole portion **6***e* of the slide plate **6**. The main shaft fixing outer shaft **24** maintains the position of the slide plate **6** at either the threading position or the sewing executing position through the engagement of the small diameter portion **24***b* and the large diameter portion **24***c* with the long hole portion **6***f* and the wide hole portion **6***e*.

With the above-described arrangement, one end of the main shaft fixing outer shaft **24** fits the notch **29***a* of the main shaft fixing plate **29** to fix the main shaft **28** at the specified phase. Further, the other end of the main shaft fixing outer shaft **24** fits the heteromorphic long hole **6***h* of the slide plate **6** to maintain the slide plate **6** at the threading position and the sewing executing position, respectively. Moreover, the main shaft fixing outer shaft **24** constitutes a unit of the main shaft fixing outer shaft **24** by accommodating the fixing inner shaft spring **25**, the main shaft fixing inner shaft **26** and the fixing inner shaft pin **27** in an inner diameter hole portion thereof.

FIG. **7** is a sectional view showing an inner structure of the air flow path switching mechanism B.

FIG. **8** is a view showing a relationship of a coupling body **37**, a switching shaft **39** and a looper selecting nob **45** in a state in which the looper selecting nob **45** is operated to a side of performing threading of an upper looper thread **58** (left side) (hereinafter referred to as "upper looper threading state").

FIG. **9** is a sectional view of the air path switching mechanism B cut at a position indicated by arrow E-E in FIG. **7** in the upper looper threading state.

For obtaining the upper looper threading state, the looper selecting knob **45** is turned in a counterclockwise direction such that its indicating projection **45***c* is directed to the left side. With this arrangement, the hemispherical concave portion **39***g* of the switching shaft **39** is urged by the click spring **40** at a phase that coincides with the click steel ball **41** accommodated in the coupling body **37** to be positioned with a click sound. At this time, since the hole **39***b* of the switching shaft **39** coincides with an inner path **44***c* of the branching body **44**, it is possible to send compressed air that flows in through the tube **36** from the hollow hole **39***a* of the switching shaft **39** up to the concave portion **44***b* on the left side as shown in FIG. **9**. A thread inserting opening **48** is inserted into the concave portion **44***b* in a state in which upward air leakage is blocked by means of an O ring **49**. The tip end of the thread inserting opening **48** is conical and includes a plurality of narrow grooves **48***b* on the conical portion. Accordingly, compressed air introduced to the concave portion **44***b* generates a flow of air of fast velocity upon passing the narrow grooves **48***b* such the upper looper thread **58** inserted from an upper end **48***c* of the thread inserting opening **48** is sucked to a thread hole **44***d* of the branching body **44** to be sent to the branching body pipe **54**.

FIG. **10** is a view showing a relationship of the coupling body **37**, the switching shaft **39** and the looper selecting nob **45** in a state in which the looper selecting nob **45** is operated to a side of performing threading of a lower looper thread **59** (right side) (hereinafter referred to as "lower looper threading state").

FIG. **11** is a sectional view of the air flow path switching mechanism B cut at the position indicated by arrow E-E in FIG. **7** in the lower looper threading state.

For obtaining the lower looper threading state, the looper selecting knob **45** is turned in a clockwise direction such that its indicating projection **45***c* is directed to the right side. With this arrangement, the hemispherical concave portion **39***g* of the switching shaft **39** is urged by the click spring **40** at a phase that coincides with the click steel ball **41** accommodated in the coupling body **37** to be positioned with a click sound. At this time, since the hole **39***b* of the switching shaft **39** coincides with an inner path **44***e* of the branching body **44**, it is possible to send compressed air that flows in through the tube **36** from the hollow hole **39***a* of the switching shaft **39** up to the concave portion **44***b* on the right side as shown in FIG. **11**. Thereafter, the same operations as those of the above-described upper looper threading state are performed whereupon the lower looper thread **59** inserted from an upper end **48***c* of the thread inserting opening **48** is sucked to a thread hole **44***f* of the branching body **44** to be sent to the branching body pipe **54**.

Returning to FIG. **1**, in the overlock sewing machine according to the present embodiment having the above-described arrangement, the upper looper **1** and the lower looper **2** mutually intersect with needle threads (not shown) held by needles while respectively holding an upper looper thread and a lower looper thread to form seams.

The looper thread path C respectively couples the main shaft fixing mechanism D and the air flow switching mechanism B. When the main shaft fixing outer shaft **24** pierces through the main body of the sewing machine or the unit base **55** and fits with the notch **29***a* of the main shaft fixing plate **29** fixed to the main shaft **28**, the loop thread path C sends the respective looper threads to the upper looper **1** or the lower looper **2** as set by the looper selecting knob **45** through compressed air that is send through the tube **36**. The two branching body pipes **54** at a terminal end of the air flow switching mechanism B is coupled to a receiving opening **12***b* of the upper looper conduction pipe **12** and a receiving opening **13***b* of the lower looper conduction pipe **13** which are inlets on the looper thread path C side to communicate compressed air.

The phase at which the main shaft fixing outer shaft **24** and the notch **29***a* of the main shaft fixing plate **29** meet is set to be timing at which the upper looper receiving opening **1***a* and the lower looper receiving opening **2***a* coincide horizontally at the looper portion A in FIG. **1** to reach an extension of the slide pipe **4**.

Setting of the threading state and the sewing executing state is performed by either pressing the main shaft fixing outer shaft **24** to the main shaft fixing plate **29** side or pulling the same to the near side, and setting can be made by operating either the fixing lever knob **19** fixed at the main shaft fixing lever **18** up and down or by operating the thread take-up lever (not shown) (which rotates simultaneously with the main shaft).

Next, switching operations between the threading state and the sewing executable state of the overlock sewing machine according to the present embodiment will be explained in details.

FIG. **12**A is a view showing a fixing lever knob **19** in a standby state for switching to threading.

FIG. **12**B is a view showing a relationship of a main shaft fixing operating arm **20**, a main shaft fixing outer shaft **24** and a main shaft fixing inner shaft **26** in the standby state for switching to threading.

FIG. **12**C is a view showing a relationship between a motor switch cap **30** and a micro switch **32** in the standby state for switching to threading.

FIG. **12**D is a view showing positions of the slide plate **6** and a slide pipe **4** in the standby state for switching to threading.

The standby state for switching to threading is a standby state in which the fixing lever knob **19** is pressed upward for performing threading. By pressing the fixing lever knob **19** upward, the main shaft fixing operating arm **20** rotates in a clockwise direction in FIG. **12**B. However, since the notch **29***a* of the main shaft fixing outer shaft **29** has not reached the phase at which it fits with the main shaft fixing outer shaft **24**, the main shaft fixing outer shaft **24** abuts the outer periphery of the main shaft fixing plate **29** and is at a stop. However, the main shaft fixing operating spring **21** constantly urges the main shaft fixing outer shaft **24** by means of the main shaft fixing operating arm **20** and the fixing inner shaft pin **27** in a central axial direction of the main shaft fixing plate **29**.

At this time, the switch contacting surface **30***a* of the motor switch cap **30** is in a state in which a button **32***a* of the micro switch **32** is pressed, that is, in which a motor driving power source is OFF. In this state, the motor will not operate even when a foot controller is stepped on for driving the motor.

The wide hole portion **6***e* of the slide plate **6** fits with the large diameter of the main shaft fixing outer shaft **24** so that it is impossible to move the slide plate **6** in a leftward direction in accordance with the urging force of the supporting plate shaft spring **10** so that the slide plate **6** and the slide pipe **4** are maintained at the current right position.

FIG. **13**A is a view showing the fixing lever knob **19** in a threading enabled state.

FIG. **13**B is a view showing a relationship of the main shaft fixing operating arm **20**, the main shaft fixing outer shaft **24** and the main shaft fixing inner shaft **26** in the threading enabled state.

FIG. **13**C is a view showing a relationship between the motor switch cap **30** and the micro switch **32** in the threading enabled state.

FIG. **13**D is a view showing positions of the slide plate **6** and the slide pipe **4** in the threading enabled state.

Subsequently to the standby state for switching to threading (states of FIGS. **12**A, **12**B, **12**C, and **12**D), when the thread take-up lever (not shown) is manually rotated to the near side, the main shaft fixing plate **29** rotates in accordance with the rotation of the main shaft **28**. With this arrangement, the notch **29***a* of the main shaft fixing plate **29** reaches the phase at which the main shaft fixing outer shaft **24** stands by. At that moment, the main shaft fixing outer shaft **24** that had been urged in the central axial direction of the main shaft fixing plate **29** plunges into the notch **29***a* whereupon both members fit with each other (state of FIG. **13**B).

Since the main shaft fixing outer shaft **24** is continuously urged in the central axial direction of the main shaft fixing plate **29** through the action of the main shaft fixing operating spring **21**, the fitting of both members is continued. Since the main shaft fixing outer shaft **24** has moved rearward, the small diameter portion **24***b* of the main shaft fixing outer shaft **24** and the long hole portion **6***f* of the slide plate **6** coincide so that the slide plate **6** moves in a left direction through the urging force of the supporting plate shaft spring **10**. Accompanying this, the two slide pipes **4** also move in the left direction and the left ends of the slide pipes **4** pierce through the round holes **23***a*, **23***b* of the looper thread take-up guide **23** and further pierce through the upper looper thread hole **3***a* and the lower looper thread hole **3***b* of the looper thread take-up **3** to respectively reach the upper looper receiving opening **1***a* and the lower looper receiving opening **2***a*.

The upper looper receiving opening **1***a* and left end of the slide pipe **4** as well as the lower looper receiving opening **2***a* and the left end of the slide pipe **4** are urged by the slide pipe spring **5** in more closely adhering directions and are coupled to make the flow of compressed air and the flow of the respective looper threads accompanying the same smoother.

At this time, the switch contacting surface **30***a* of the motor switch cap **30** continuously keeps on pressing the button **32***a* of the micro switch **32** and the motor driving power source is in the OFF state.

FIG. **14**A is a view showing the fixing lever knob **19** in a standby state for cancelling threading.

FIG. **14**B is a view showing a relationship of the main shaft fixing operating arm **20**, the main shaft fixing outer shaft **24** and the main shaft fixing inner shaft **26** in the standby state for cancelling threading.

FIG. **14**C is a view showing a relationship between the motor switch cap **30** and the micro switch **32** in the standby state for cancelling threading.

FIG. **14**D is a view showing positions of the slide plate **6** and the slide pipe **4** in the standby state for cancelling threading.

Upon completion of threading in the threading enabled state (state of FIG. **13**A, **13**B, **13**C, **13**D), by pressing the fixing lever knob **19** downward, the main shaft fixing operating arm **20** rotates in the counterclockwise direction in FIG. **14**B. However, since the small diameter portion **24***b* of the main shaft fixing outer shaft **24** and the long hole portion **6***f* of the slide plate **6** are fitting with each other, the main shaft fixing outer shaft **24** cannot move to the near side. Therefore, the fixing inner shaft pin **27** and the main shaft fixing inner shaft **26** absorb a moving amount in the horizontal direction by the main shaft fixing operating arm **20** by compressing the fixing inner shaft spring **25** at the inner diameter portion of the main shaft fixing outer shaft **24**.

At this time, the tip end of the main shaft fixing outer shaft **24** has not slipped out from the notch **29***a* of the main shaft fixing plate **29** so that the main shaft **28** is in a state in which it is impossible to rotate. Similarly, the slide plate **6** and the slide pipe **4** are maintained in a condition in which they are moved to the left side.

Further, at this time, the switch contacting surface **30***a* of the motor switch cap **30** continuously remains pressing the button **32***a* of the micro switch **32**, that is, the motor driving power source is in the OFF state.

FIG. **15**A is a view showing the fixing lever knob **19** in a sewing executable state.

FIG. **15**B is a view showing a relationship of the main shaft fixing operating arm **20**, the main shaft fixing outer shaft **24** and the main shaft fixing inner shaft **26** in the sewing executable state.

FIG. **15**C is a view showing a relationship between the motor switch cap **30** and the micro switch **32** in the sewing executable state.

FIG. **15**D is a view showing positions of the slide plate **6** and the slide pipe **4** in the sewing executable state.

Subsequently to the standby state for cancelling threading (states of FIGS. **14**A, **14**B, **14**C, and **14**D), when the user holds the projecting knob portion **6***g* of the slide plate **6** to move the slide plate **6** in the right direction, the wide hole portion **6***e* of the slide plate **6** reaches a position at which it coincides with the main shaft fixing outer shaft **24**. At that moment, the main shaft fixing outer shaft **24** that had been urged to the near side by the fixing inner shaft spring **25** projects to the near side.

With the main shaft fixing outer shaft **24** projecting to the near side, the large diameter portion of the main shaft fixing outer shaft **24** and the wide hole portion **6***e* of the slide plate **6** fit with each other so that the slide plate **6** remains at the current position against the urging force of the supporting plate shaft spring **10**. The two slide pipes **4** similarly move to the right side and remain as they are.

At this time, since the main shaft fixing outer shaft **24** has moved to the foremost position, the motor switch cap **30** fixed at the main shaft fixing outer shaft **24** also moves to the foremost position. At this time, the switch contacting surface **30***a* of the motor switch cap **30** retracts from the button **32***a* of the micro switch **32** for the first time to be in a state of allowing driving of the motor, that is, the motor driving power source will be in a ON state, and when the user steps on the foot controller, the motor is rotated to drive the sewing machine.

A surface of the boss **30***b* of the motor switch cap **30** will be exposed from an identification window **56***a* which is an aperture portion provided on a front surface cover **56** which is a casing member of the sewing machine. Accordingly, when the boss portion **30***b* of the motor switch cap **30** is exposed from this identification window **56***a*, it can be determined that a thread passage is in a sewing enabled state and that the motor is also drivable. On the contrary, when the motor switch cap **30** is withdrawn in the back of the identification window **56***a*, it indicates that the motor cannot be driven and that sewing cannot be executed.

As explained so far, according to the overlock sewing machine of the present embodiment, switching between the threading enabled state and the sewing executable state is enabled through one hand operation by creating standby stages for respective operating states by means of a lever for switching (main shaft fixing lever **18**, fixing lever knob **19**).

The operation using the lever is an operation of exceeding the neutral point of the urging force of the main shaft fixing operating spring **21** for changing the direction of action of the urging force of the main shaft fixing operating spring **21** which can be smoothly operated causing no extreme load changes.

Further, the operational feeling of this action using the lever is favorable in view of the point that when the neutral point is exceeded, the main shaft fixing lever **18** and the fixing lever knob **19** automatically rotate through the urging force of the main shaft fixing operating spring **21** to move to specified positions. Such favorable operational feelings according to the present invention cannot be obtained by means of the prior art in which grooved cams are used for making the main shaft fixing outer shaft **24** and other members move directly and forcibly.

Still further, in a method of using a conventional grooved cam, the operating force amount could not be reduced without making operation strokes longer so that increases in size were inevitable. In contrast thereto, in the present invention, the operating force amount can be changed by merely changing the ratio of the lever arm length, the degree of freedom of design in view of setting the operating force amount and the arrangement of the fixing lever knob **19** is high, and it is possible to provide an overlock sewing machine of small size and favorable operational feeling.

Moreover, the overlock sewing machine according to the present embodiment comprises the identification window **56***a* through which the threading enabled state and the sewing executable state can be identified at a glance and a safety device (motor switch cap **30**, micro switch **32**) enabling/disabling motor driving interconnected therewith so that it is very safe and easy to use.

<Modified Embodiment>

The present invention is not limited to the above explained embodiment but various modifications and changes are possible which are also included in the present invention.

(1) In the present embodiment, the relationship between the main shaft fixing outer shaft **24** as the first shaft and the main shaft fixing inner shaft **26** as the second shaft has been explained while citing an example in which the second shaft side is located inside. The present invention is not limited to this arrangement, and it can be arranged in that the first shaft side is inside and the second shaft side is outside. Further, the invention is not limited to an embodiment in which one shaft is inserted into the interior of the other shaft, but any arrangement in which both members are relatively movable in an axial direction would do, and any embodiment including, for instance, a case in which a rail-like guide portion is provided, would do.

(2) In the present embodiment, explanations have been made citing a case in which the fixing inner shaft pin **27** as a shaft pin is provided at the main shaft fixing inner shaft **26** as the second shaft. The present invention is not limited to this

arrangement, and the shaft pin might, for instance, be provided on the rocking lever portion side. In this case, it is preferable to provide a long hole shape or the like on the second shaft for enabling movements of the second shaft even when the shaft pin moves in an arc-like shape.

In this respect, while the embodiment and the modified embodiments can be used upon suitably combining them, detailed explanations will be omitted. The present invention is not to be limited by the above explained respective embodiments.

Explanation Of The Reference Numbers

A looper portion
B air flow path switching mechanism
C looper thread path
D main shaft fixing mechanism
1 upper looper
1*a* upper looper receiving opening
1*b* pipe-like member
1*c* upper looper point
2 lower looper
2*a* lower looper receiving opening
2*b* pipe-like member
2*c* lower looper point
3 looper thread take-up
3*a* upper looper thread hole
3*b* lower looper thread hole
4 slide pipe
4*a* flange portion
5 slide pipe spring
6 slide plate (slide member)
6*a* U groove
6*b*, **6***c* round hole
6*d* long hole
6*e* wide hole portion
6*f* long hole portion
6*g* projecting knob portion
6*h* heteromorphic long hole
7 looper pipe supporting plate
7*a*, **7***b* through hole
7*c*, **7***e* right-side surface hole
7*d*, **7***f* left-side surface hole
8 supporting plate shaft
9, **15**, **17** E-shaped snap ring
10 supporting plate shaft spring
12 upper looper conduction pipe
12*a* linear portion
12*b* receiving opening
13 lower looper conduction pipe
13*a* linear portion
13*b* receiving opening
14 sliding plate support
14*a* pin with E-grooves
14*b* round hole
14*c* , **14***d* through hole
14*e* arc-shaped long hole
14*f* small hole
16 main shaft fixing operating shaft
18 main shaft fixing lever
18*a* arm (main shaft fixing lever portion)
18*b* pin
19 fixing lever knob
20 main shaft fixing operating arm (main shaft fixing operating arm portion)
20*a* pin
20*b* shaft pin engaging portion
21 main shaft fixing operating spring
23 looper thread take-up guide
23*a*, **23***b* round hole
24 main shaft fixing outer shaft (first shaft)
24*a* side surface long hole (engaging portion)
24*b* small diameter portion
24*c* large diameter portion
25 fixing inner shaft spring (shaft spring)
26 main shaft fixing inner shaft (second shaft)
27 fixing inner shaft pin (shaft pin)
28 main shaft
29 main shaft fixing plate
29*a* notch
30 motor switch cap (identification member)
30*a* switch contacting surface
30*b* boss portion
32 micro switch
32*a* button
33 switch mounting plate
36 tube
37 coupling body
37*a*, **37***b* hollow boss
37*c* hollow hole
37*d* concave portion
38, **43**, **49** O ring
39 switching shaft
39*a* hollow hole
39*b* hole
39*c* angular shaft
39*d* central hole
39*e* angular groove
39*f* flange
39*g* hemispherical concave portion
40 click spring
41 click steel ball
42 hexagonal nut
43 branching body
44*a* central hole
44*b* concave portion
44*c* inner path
44*d* thread hole
44*e* inner path
44*f* thread hole
45 looper selecting knob
45*a* angular projection
45*b* central through hole
45*c* indicating projection
11, **22**, **31**, **34**, **35**, **46**, **51**, **52**, **53**, **57** screw
47 cap
48 thread inserting opening
48*a* upper portion boss
48*b* narrow groove
48*c* upper end
50 branching base plate
50*a* round hole
54 branching body pipe
55 unit base
56 front surface cover (casing member)
56*a* identification window (aperture portion)
58 upper looper thread
59 lower looper thread

The invention claimed is:

1. An overlock sewing machine comprising:

at least one looper including an receiving opening for receiving a looper thread and having a hollow structure through which the looper thread passes;

a thread inserting opening into which the looper thread is inserted that is to be inserted to the looper; a looper conduction pipe that guides the looper thread inserted into the thread inserting opening towards the receiving opening;

a slide pipe provided between the looper conduction pipe and the receiving opening and which one end is fitted to the looper conduction pipe in a freely slidable manner while its other end is provided to be movable between a threading position at which it is connected to the receiving opening and a sewing executing position at which the other end is separated from the receiving opening;

a slide member which is a member that holds the slide pipe and that moves between the threading position and the sewing executing position together with the slide pipe, having a long hole portion that extends along the moving direction and a wide hole portion that is formed in connection with the long hole portion and which width is formed to be larger than the width of the long hole portion;

a slide member spring for urging the slide member and the slide pipe towards the receiving opening side;

a main shaft that is rotationally driven;

a main shaft fixing plate that is fixed to the main shaft and that includes a notch at an outer peripheral position corresponding to a threading phase at which the receiving opening is at a position at which it is connectable to the other end of the slide pipe;

a first shaft which is an axial member which one end is provided to be movable between an engaging position at which it engages with the notch for fixing the main shaft at the threading phase and a retracted position at which it is completely separated from the main shaft fixing plate, comprising a small diameter portion and a large diameter portion at the other end thereof that respectively engage with the long hole portion and the wide hole portion of the slide member, wherein the position of the sliding member is maintained at each of the threading position and the sewing executing position through the engagement of the small diameter portion and the large diameter portion with the long hole portion and the wide hole portion;

a second shaft that is provided to be relatively movable along an axial direction of the first shaft;

a shaft spring for urging the first shaft and the second shaft in mutually separating directions;

a shaft pin that is provided at the second shaft to project from the second shaft or that engages with the second shaft to be integrally movable in an axial direction of the second shaft;

an engaging portion that is provided at the first shaft to engage with the shaft pin and/or the second shaft to receive force to move the first shaft towards the main shaft fixing plate side;

a rocking lever portion including a main shaft fixing operating arm portion provided with a shaft pin engaging portion that engages with the shaft pin or with the shaft pin and a main shaft fixing lever portion provided to be operable by a user and being rockable within a specified range; and

a main shaft fixing operating spring which urging direction is switched to both rocking directions of the rocking lever portion by exceeding a neutral point through rocking operations of the rocking lever portion.

2. The overlock sewing machine as claimed in claim **1**, comprising:

a casing member formed with an opening portion that is visible to at least the user at the time of operation,

wherein a part of the first shaft and/or a part of an identifying member that moves integrally with the first shaft comes to a position at which it is exposed from the opening portion when the first shaft has moved to the retracted position to indicate that the sewing machine is in a sewing executable state in which the slide pipe and the slide member have moved to the sewing executing position so as to enable sewing.

3. The overlock sewing machine as claimed in claim **1**, comprising:

a switch that allows driving of a motor for driving the main shaft only when the first shaft has moved to the retracted position so that the sewing machine is in a sewing executable state so as to enable sewing.

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